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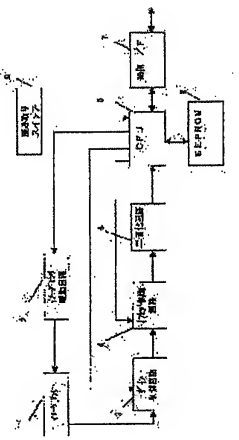
(54) OPTICAL INFORMATION READER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an optical information reader capable of speedily reading set voltage gain, offset value and shutter speed by one time downloading even though they are lost when power source is turned off after completion of reading and they are required to be reset in the case of re-reading.

SOLUTION: In the optical information reader, values expressing a reading feasibility such as the gain, the offset value, the shutter speed are stored in an EEPROM 8 being a nonvolatile memory after the reading, and when the previous reading is success the values stored is set in the EEPROM 8 in the case of the reading.



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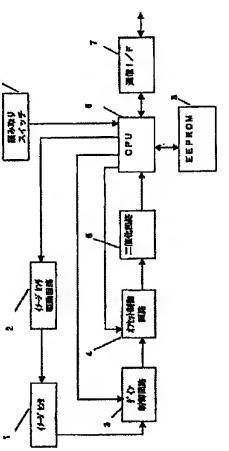
最終頁に続く

(54)【発明の名称】　光学情報読取装置

(57)【要約】
【課題】　読み取り終了後、電源を切断してしまうと、設定していた電源ゲイン、オフセット値、シャッタスピードが消え、再度読み取り時に、再設定する必要がある。一度の取り込みで読み取る高速読み取り可能な光学情報読取装置を提供することを目的とする。
【解決手段】　読み取り後に、不揮発性メモリであるＥＥＰＲＯＭ８に読取成否を示す値、ゲイン、オフセット値、シャッタスピードを格納し、前回の読み取りが成功している場合、読み取り時にＥＥＰＲＯＭ８に格納されている値を設定するようにした。



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【特許請求の範囲】

【請求項１】　標識からの反射光を取り込み電気信号に変換するイメージセンサと、前記イメージセンサからの電気信号を増幅するゲインが設定可能なゲイン制御手段と、前記ゲイン制御手段により増幅された電気信号をデジタル信号に変換するＡＤ変換器または前記ゲイン制御手段により増幅された電気信号を二値化する二値化手段と、前記標識の有する情報を復元するため前記イメージセンサからの電気信号であってデジタル化された信号をデコードするデコード手段と、前記ゲイン制御手段のゲインを電気的にバックアップ可能な不揮発性メモリに格納するゲイン格納手段を有する光学情報読取装置。

【請求項２】　標識からの反射光を取り込み電気信号に変換するイメージセンサと、前記イメージセンサからの電気信号のオフセット値が設定可能なオフセット制御手段と、前記オフセット制御手段によりオフセットされた電気信号をデジタル信号に変換するＡＤ変換器または前記オフセット制御手段によりオフセットされた電気信号を二値化する二値化手段と、前記標識の有する情報を復元するため前記イメージセンサからの電気信号であってデジタル化された信号をデコードするデコード手段と、前記オフセット制御手段のオフセット値を電気的にバックアップ可能な不揮発性メモリに格納するオフセット値格納手段を有する光学情報読取装置。

【請求項３】　標識からの反射光を取り込み電気信号に変換するイメージセンサと、前記イメージセンサのシャッタスピードが設定可能な電子シャッタ制御手段と、前記イメージセンサからの電気信号をデジタル信号に変換するＡＤ変換器または前記イメージセンサからの電気信号を二値化する二値化手段と、前記標識の有する情報を復元するため前記イメージセンサからの電気信号であってデジタル化された信号をデコードするデコード手段と、前記電子シャッタ制御手段のシャッタスピードを電気的にバックアップ可能な不揮発性メモリに格納するシャッタスピード格納手段を有する光学情報読取装置。

【請求項４】　デコード後、デコードの成功または失敗を示す値を電気的にバックアップ可能な不揮発性メモリに格納する読取成否結果格納手段を有する請求項１、２または３いずれかに記載の光学情報読取装置。

【請求項５】　デコード後、デコード時のゲインを電気的にバックアップ可能な不揮発性メモリに格納するゲイン格納手段を有する請求項１記載の光学情報読取装置。

【請求項６】　デコード後、デコード時のオフセット値を電気的にバックアップ可能な不揮発性メモリに格納するオフセット値格納手段を有する請求項２記載の光学情報読取装置。

【請求項７】　デコード後、デコード時のシャッタスピードを電気的にバックアップ可能な不揮発性メモリに格納するシャッタスピード格納手段を有する請求項３記載の光学情報読取装置。

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【請求項８】　前回のデコードが成功した場合、前回のデコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードを設定する設定手段を有する請求項１～７いずれかに記載の光学情報読取装置。

【請求項９】　デコード後、デコードの成功または失敗を示す値、かつ／またはデコード時のゲイン、かつ／またはデコード時のオフセット値、かつ／またはデコード時のシャッタスピードをホストなどへ送信する送信手段を有する請求項１～７いずれかに記載の光学情報読取装置。

【請求項１０】　前記送信手段によりホストなどへ送信された前回のデコードの成功または失敗を示す値、かつ／または前回のデコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードをホストなどから受信する受信手段と、前回のデコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードを設定する設定手段を有する請求項９記載の光学情報読取装置。

【請求項１１】　前記受信手段により受信した前回のデコードの成功または失敗を示す値が成功を示している場合、前回のデコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードを設定する設定手段を有する請求項９または１０いずれかに記載の光学情報読取装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、バーコードや２次元コード等の標識を読み取る光学情報読取装置に関するものである。

【０００２】

【従来の技術】以下、光学情報読取装置のうち、特にイメージセンサに１次元（リニア）イメージセンサを用いたバーコードについて説明する。なお、本発明はバーコードリーダに限定されることはなく、２次元コードリーダや、ＯＣＲリーダやバーコードリーダー体型ハンドヘルドターミナル、２次元コードリーダー体型ハンドヘルドターミナルのような光学的に情報を読取可能な携帯情報端末等にも適用できることはいうまでもない。

【０００３】従来のバーコードリーダのブロック図を図１０に示す。１はイメージセンサで、標識やその周辺からの反射光を電気信号に変換する。２はイメージセンサ駆動回路で、イメージセンサ１を駆動するタイミングを生成するとともに、シャッタスピードを電気的に制御することが可能な電子シャッタ機能を有する。イメージセンサ駆動回路２は、イメージセンサ１に内蔵されている場合や、後述するＣＰＵ６に内蔵されている場合もある。３はゲイン制御回路でイメージセンサ１から出力される信号を設定されたゲインで増幅する。４はオフセッ

ト制御回路でゲイン制御回路３により増幅された信号の電圧レベルを上下にオフセットする。なお、ゲイン制御回路３とオフセット制御回路４の順番は入れ換えられる場合もある。５は二値化回路でオフセット制御回路４からのアナログ信号をデジタル信号に変換する。６はＣＰＵでマイクロプロセッサにより構成され、主にバーコードのデコード処理をする。ＣＰＵ６の実行プログラムが格納されているプログラムメモリや、実行に必要なワークメモリはＣＰＵ６に内蔵されていることが多く図示していない。ＣＰＵ６はゲイン制御回路３のゲイン制御、オフセット制御回路４のオフセット値の制御、ならびにイメージセンサ駆動回路２から出力するタイミングを変更することによりシャッタスピードを制御する。またＣＰＵ６でデコードされたデータなどは、７の通信Ｉ／Ｆ（通信インターフェイス）を通じて、ＰＯＳやＰＣなどのホストなどに送信される。

【０００４】なお、デコード処理は、解読処理または認識処理とも呼ばれ、厳密にはデジタル信号からバーコードなどの標識を認識（解読）する処理のことであるが、一般には単に読み取り処理とも呼ばれている。本文では、デコード処理とはＣＰＵによる解読（認識）処理のことをさし、読み取り処理は初期設定などの各種設定や、通信、デコード処理を含む読み取りに必要な処理全体を意味する。

【０００５】次に従来例の読み取り処理の流れを図１１に示す。ステップ１はゲイン、オフセット値、シャッタスピードの初期設定処理で、ＣＰＵ６はあらかじめプログラムされたゲイン、オフセット値、シャッタスピードのそれぞれの初期設定値をゲイン制御回路３、オフセット制御回路４、イメージセンサ駆動回路２に設定する。ステップ２は二値化回路出力取り込み処理で、ＣＰＵ６はイメージセンサ１からの出力信号を、ゲイン制御回路３、オフセット制御回路４、二値化回路５を介して取り込む。ステップ３はバーコードのデコード処理で、ＣＰＵ６は、取り込まれたデジタル信号をバーコードのデコードアルゴリズムに基づいてデコード処理を行う。デコード処理でデコードが成功した場合（ステップ４）、デコード結果を通信Ｉ／Ｆ７を経由して外部のＰＣやＰＯＳなどのホストへ送信（ステップ６）した後、次の二値化回路出力取り込みを行う。

【０００６】一方デコードが失敗した場合、ゲイン、オフセット値、シャッタスピードの少なくともいずれか一つを変更し（ステップ５）、変更した値をゲイン制御回路３、オフセット制御回路４、イメージセンサ駆動回路２に設定した後（ステップ１１）、次の二値化回路出力取り込みを行う。

【０００７】図１２にプログラムメモリにあらかじめ格納されたゲイン、オフセット値、シャッタスピードの表（テーブル）を示す。図１１のステップ１で、例えば初期値としてゲイン、オフセット値、シャッタスピードは、それぞれアドレス（Ａ０００、Ｂ０００、Ｃ０００）に格納されたデータ（ゲイン０、オフセット値０、シャッタスピード０）が設定される。デコードが成功しない場合、図１１のステップ５で示すように、ゲイン、オフセット値、シャッタスピードのうち少なくともいずれか一つの設定値が変更され、次の二値化回路出力取り込みを行う。

【０００８】なお、電源が切られた場合や、読み取りスイッチ（図示せず）が設けられそのスイッチがオフにされた場合や、タイマなどによってあらかじめ設定した読み取り時間が過ぎた場合などは読み取りが強制的に終了する。

【０００９】

【発明が解決しようとする課題】近年省エネルギーの観点から、消費電流をできるだけ少なくすることが要望され、バーコードリーダや２次元コードリーダでは、読み取る時のみ読取装置の電源を通電することが行われている。

【００１０】また、工場や車内など、接続するホストから離れた環境での使用では、一般にハンドヘルドターミナルと呼ばれる、携帯型の光学読取装置がよく使用される。ハンドヘルドターミナルは、電池駆動で少しでも使用時間を長くするために可能な限り電源を制御し、消費電流を少なくする必要が特にある。そのため、読み取りのたびに、読み取りに関する部分の電源を通電する、つまり読み取り時以外には読み取りに関する部分の電源をオフにすることが行われている。

【００１１】しかし、図１１の流れ図に示す処理では、読取装置の電源が一度切断されると、再度電源投入時には、ステップ１のゲイン、オフセット値、シャッタスピードの初期設定からやり直さなければならず、初期値でデコードが失敗した場合、デコードが成功する設定値になるまで、ステップ５でゲイン、オフセット値、シャッタスピードの変更が少なくとも一度必要であり、読み取りが成功するまでに時間がかかるという課題があった。特にデコード可能なゲインの範囲、オフセット値の範囲、シャッタスピードの範囲が狭いバーコード、例えばバーコードとその周辺のコントラストが悪いものを読み取る場合には、デコード可能なゲイン、オフセット値、シャッタスピードの設定の組み合わせが少ないため、最適な設定値の設定までに何回もゲイン、オフセット値、シャッタスピードの変更が必要となるため、読み取りが成功するまでの時間が非常にかかるという課題があった。

【００１２】さらにバーコードなどの標識を含むラベルに接触して読み取るタイプの光学読取装置の場合、読み取り口が、外光を遮断しているため、周囲の読み取り環境の変化の影響を受けることが少なく、製造時に最適なゲイン、オフセット値、シャッタスピードを設定しておけば、その後変更しなくてもよい場合が多かった。しか

し、近年２次元コードリーダを中心に、標識を含むラベルから離して読み取るタイプの光学読取装置が増えてきた。このタイプの場合、周囲の外光の影響を直接ラベルに受けるので、設定できる範囲を大きくかつ設定値のステップを細かく設計する必要があり、デコード可能な設定値の設定に時間がかかり、デコードが成功するまでの時間が非常にかかるという課題があった。

【００１３】本発明はこのような課題を解決するもので、高速読取が可能な光学情報読取装置を提供することを目的とする。

【００１４】

【課題を解決するための手段】以上の目的を達成するために本発明の第１の光学情報読取装置は、標識からの反射光を取り込み電気信号に変換するイメージセンサと、前記イメージセンサからの電気信号を増幅するゲインが設定可能なゲイン制御手段と、前記ゲイン制御手段により増幅された電気信号をデジタル信号に変換するＡＤ変換器または前記ゲイン制御手段により増幅された電気信号を二値化する二値化手段と、前記標識の有する情報を復元するため前記イメージセンサからの電気信号であってデジタル化された信号をデコードするデコード手段と、前記ゲイン制御手段のゲインを電気的にバックアップ可能な不揮発性メモリに格納するゲイン格納手段を有するものである。

【００１５】第２の光学情報読取装置は、標識からの反射光を取り込み電気信号に変換するイメージセンサと、前記イメージセンサからの電気信号のオフセット値が設定可能なオフセット制御手段と、前記オフセット制御手段によりオフセットされた電気信号をデジタル信号に変換するＡＤ変換器または前記オフセット制御手段によりオフセットされた電気信号を二値化する二値化手段と、前記標識の有する情報を復元するため前記イメージセンサからの電気信号であってデジタル化された信号をデコードするデコード手段と、前記オフセット制御手段のオフセット値を電気的にバックアップ可能な不揮発性メモリに格納するオフセット値格納手段を有するものである。

【００１６】第３の光学情報読取装置は、標識からの反射光を取り込み電気信号に変換するイメージセンサと、前記イメージセンサのシャッタスピードが設定可能な電子シャッタ制御手段と、前記イメージセンサからの電気信号をデジタル信号に変換するＡＤ変換器または前記イメージセンサからの電気信号を二値化する二値化手段と、前記標識の有する情報を復元するため前記イメージセンサからの電気信号であってデジタル化された信号をデコードするデコード手段と、前記電子シャッタ制御手段のシャッタスピードを電気的にバックアップ可能な不揮発性メモリに格納するシャッタスピード格納手段を有するものである。

【００１７】第４の光学情報読取装置は、デコード後、デコードの成功または失敗を示す値を電気的にバックアップ可能な不揮発性メモリに格納する読取成否結果格納手段を有するものである。

【００１８】第５の光学情報読取装置は、デコード後、デコード時のゲインを電気的にバックアップ可能な不揮発性メモリに格納するゲイン格納手段を有するものである。

【００１９】第６の光学情報読取装置は、デコード後、デコード時のオフセット値を電気的にバックアップ可能な不揮発性メモリに格納するオフセット値格納手段を有するものである。

【００２０】第７の光学情報読取装置は、デコード後、デコード時のシャッタスピードを電気的にバックアップ可能な不揮発性メモリに格納するシャッタスピード格納手段を有するものである。

【００２１】第８の光学情報読取装置は、前回のデコードが成功した場合、前回のデコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードを設定する設定手段を有するものである。

【００２２】第９の光学情報読取装置は、デコード後に、デコードの成功または失敗を示す値、かつ／またはデコード時のゲイン、かつ／またはデコード時のオフセット値、かつ／またはデコード時のシャッタスピードをホストなどへ送信する送信手段を有するものである。

【００２３】第１０の光学情報読取装置は、前記送信手段によりホストなどへ送信された前回のデコードの成功または失敗を示す値、前回のデコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードをホストなどから受信する受信手段と、デコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードを設定する設定手段を有するものである。

【００２４】第１１の光学情報読取装置は、前記受信手段により受信した、前回のデコードの成功または失敗を示す値が成功を示しているとき、前回のデコード時のゲイン、かつ／または前回のデコード時のオフセット値、かつ／または前回のデコード時のシャッタスピードを設定する設定手段を有するものである。

【００２５】

【発明の実施の形態】上記構成により、第１の光学情報読取装置は、電気的にバックアップ可能な不揮発性メモリからなるゲイン格納手段により、例え読取装置の電源が切られたとしても、ゲイン制御回路のゲインを格納しておくことができる。

【００２６】第２の光学情報読取装置は、電気的にバックアップ可能な不揮発性メモリからなるオフセット値格納手段により、例え読取装置の電源が切られたとしても、オフセット制御回路のオフセット値を格納しておく

ことができる。

【００２７】第３の光学情報読取装置は、電気的にバックアップ可能な不揮発性メモリからなるシャッタスピード格納手段により、例え読取装置の電源が切られたとしても、電子シャッタ制御手段のシャッタスピードを格納しておくことができる。

【００２８】第４の光学情報読取装置は、電気的にバックアップ可能な不揮発性メモリからなる読取成否結果格納手段により、例え読取装置の電源が切られたとしても、デコードの成功または失敗を示す値を格納しておくことができる。

【００２９】第８の光学情報読取装置は、前回のデコードが成功した場合、前回デコード時のゲイン、オフセット値、シャッタスピードの少なくとも何れかを設定した後、デコードをすることができる。

【００３０】第９の光学情報読取装置は、デコード後に、デコードの成功または失敗を示す値、ゲイン、オフセット値、シャッタスピードの少なくとも何れかをホスト等へ送信することができる。

【００３１】第１０の光学情報読取装置は、ホストなどへ送信された前回デコード時のゲイン、オフセット値、シャッタスピードの少なくとも何れか一つをホストから受信し、それらの値を設定することができる。

【００３２】以下、本発明の実施の形態について、図を参照しながら説明する。

【００３３】（実施の形態１）図１に本発明の実施の形態１の光学情報読取装置のブロック図を示す。ここで従来例のブロック図を示す図１０と同じ部分は同じ符号を用い説明は省略する。

【００３４】８は不揮発性メモリとして電気的に消去可能なＥＥＰＲＯＭを本発明の形態では使用した。なお不揮発性メモリはＥＥＰＲＯＭに限定されるものでなく、強誘電体メモリ（ＦｅＲＡＭ）や、電池によってバックアップされたＳＲＡＭ、ＤＲＡＭを含む。不揮発性メモリ８によって、読取装置の電源が切られた場合でも、メモリ内に記憶されたデータを保持することができる。

【００３５】９は読み取りスイッチで、読み取りスイッチがオンされると、ＣＰＵ６は読み取り処理を実行する。読み取りスイッチはオンしている間読み取りを行い、オフにした時に読み取りを終了するように構成しても、一度スイッチをオンすると読み取りを一度行う構成としても構わないし所定の回数読み取りを行なう構成としても構わない。さらに、読み取りスイッチ９は必ず必要なものではなく、ホストからの通信による読み取り指令でも構わない。

【００３６】図２はＥＥＰＲＯＭ８の格納形式を表す一例で、ゲイン格納領域と、オフセット値格納領域と、シャッタスピード格納領域と、読取成否結果格納領域に分かれており、それぞれ、ゲイン、オフセット値、シャッタスピードの設定値と読取成否結果を示す値をデコード後に格納する。本発明の実施の形態１では、デコードの成功時には、デコード時のゲイン、オフセット値、シャッタスピードの設定値のアドレスとデコードの成否結果がＥＥＰＲＯＭ８に格納される。またデコードの失敗時には、ゲイン、オフセット値、シャッタスピードのいずれかが二値化回路の出力に応じて変更された後、ゲイン、オフセット値、シャッタスピードの設定値のアドレスと、デコードの成否結果がＥＥＰＲＯＭ８に格納される。

【００３７】図２の例では、ゲインはＥＥＰＲＯＭ８のアドレス（Ｄ０００、Ｄ００１、Ｄ００２）に、ゲイン、オフセット値、シャッタスピードの設定値のアドレス（Ａ０００、Ｂ００１、Ｃ００５）がデータとして格納されており、デコードの成功／失敗は、フラグとしてアドレス（Ｄ００３）に格納されている。なお、アドレス（Ｄ００３）には、デコードの成功時はデータ（０００１）、デコードの失敗時はデータ（００００）が書き込まれる。

【００３８】次に本発明の実施の形態１の処理の流れを図３に示す。ここで従来例の流れ図を示す図１１と同じ処理は同じ符号を用い説明は省略する。

【００３９】ステップ１１は、設定手段で、前回格納されたゲイン、オフセット値、シャッタスピードをそれぞれゲイン制御回路３、オフセット制御回路５、イメージセンサ駆動回路２に設定する。具体的には、図２に示すデータが格納されている場合、ＣＰＵ６はアドレス（Ｄ０００、Ｄ００１、Ｄ００２）に格納されているデータ（Ａ０００、Ｂ００１、Ｃ００５）をアドレスとする設定値（ゲイン０、オフセット値１、シャッタスピード５）を設定しステップ２へ進む。デコードが成功した場合、ホストへデータ送信後（ステップ６）、ゲイン、オフセット値、シャッタスピードをＥＥＰＲＯＭ８のアドレス（Ｄ０００、Ｄ００１、Ｄ００２）にそれぞれ格納し（ステップ１２）、その後デコード成功を示すデータ（０００１）をＥＥＰＲＯＭ８のアドレス（Ｄ００３）に格納し（ステップ１３）、読み取り処理を終了する。デコードが失敗した場合、ホストへデータの送信を行わず、二値化回路の出力に応じて、ゲイン、オフセット値、シャッタスピードの少なくとも一つを変更し（ステップ５）、変更した設定値をＥＥＰＲＯＭ８のアドレス（Ｄ０００、Ｄ００１、Ｄ００２）にそれぞれ格納し（ステップ１２）、その後デコード失敗を示すデータ（００００）をＥＥＰＲＯＭ８のアドレス（Ｄ００３）に格納し（ステップ１３）、読み取り処理を終了し電源を切断する。

【００４０】具体的にステップ５では、デコードに失敗した場合、二値化回路の出力が、黒を示す値が多い場合、または黒を示す期間が長いと判断された場合、二値化出力が小さいと判断されオフセット値やゲインを上げる。逆に白が多い場合は、オフセット値やゲインを下げ

る。

【００４１】このように、消費電流を少なくするため、読み取り時のみ読取装置に電源を入れる場合、前回読み取りを行ったときとバーコードの印字状態や周囲環境、特に周囲の明るさが同じで、前回のデコードが成功した場合、デコード可能なゲイン、オフセット値、シャッタスピードがステップ１１で設定されるため、電源投入後最初の設定でデコードを行うことができ、読み取り時間を短縮する効果がある。

【００４２】一般的に読み取り時の明るさなどの周囲環境は、室内であればほぼ同じである場合が多く、また屋外であっても、急変せずに緩やかに変化することが多い。

【００４３】さらに、あらかじめ袋や容器に印字されたバーコードを除くと、工場や倉庫内、運輸業界で使用されるコードは、黒で印字され印字状態はほぼ同じであることが多く、前回のデコードで成功したゲイン、オフセット値、シャッタスピードでデコード可能な場合が多い。

【００４４】（実施の形態２）実施の形態１では、標識としてバーコードを読み取る装置を用いたが、標識はバーコードに限定されず、２次元コードやＯＣＲも含むことは明らかである。２次元コードやＯＣＲを読み取る装置である本発明の実施の形態２の光学情報読取装置のブロック図を図４に示す。１０はＡＤ変換器で図１の二値化回路５の代わりにアナログ信号を８ビットのデジタル値に変換する。イメージセンサ１には、エリアＣＣＤなどのエリアイメージセンサが用いられる。エリアイメージセンサの出力は、２次元方向にデータを持っているため、従来例や実施の形態１のバーコード読取装置で使用していた二値化回路５ではシェーディングなどの影響を受け正確に二値化できないため、ＡＤ変換器１０が用いられ８ビットのデジタル信号に変換され、ＣＰＵ６によって二値化処理が行われる。１１は画像メモリで、エリアイメージセンサの画素は通常約３３万画素と多く、一般にはＣＰＵ６にメモリが内蔵できないため、ＣＰＵ６の外部にＳＲＡＭやＤＲＡＭで構成される。ＣＰＵ６は画像メモリ１１のデータをデコード処理する。なおＡＤ変換器１０の出力を画像メモリ１１に格納するためのＤＭＡ（ダイレクト・メモリ・アクセス）回路は図示していない。またイメージセンサ１は、エリアＣＣＤでもＣＭＯＳタイプのエリアイメージセンサでも構わない。

【００４５】次に本発明の実施の形態２の処理の流れを図５に示す。ここで従来例の流れ図を示す図１１、本発明の実施の形態１の流れ図を示す図３と同じ処理は同じ符号を用い説明は省略する。

【００４６】ステップ１４はＡＤ変換器１０の出力を画像メモリ１１に取り込む処理で、取り込み終了後、２次元コードやＯＣＲのデコード処理に進む（ステップ１５）。

【００４７】イメージセンサ１にエリアイメージセンサを使用した場合、画素数が多いため、ＡＤ変換器１０の出力を取り込むステップ１４の処理に時間がかかる。さらにステップ１５の２次元コードやＯＣＲのデコードも、データ数が多いことに加え、ＣＰＵ６がソフト的に二値化処理を行わなければならないため、一回のデコード処理に時間がかかる。そのため、前回のデコードが成功した場合、次回のデコードにおいて、２次元コードやＯＣＲの印字状態や周囲環境が同じ条件であれば、前回のゲイン、オフセット、シャッタスピードの条件設定をそのまま用いることができるため、確実かつ短時間にデコードができ、実施の形態１で説明したより、読み取り時間を短縮する効果が大きい。

【００４８】なお、ゲイン、オフセット値、シャッタスピード、読取成否結果のメモリへの格納形式は、実施の形態１で示した図２と同じとした。

【００４９】（実施の形態３）次に本発明の実施の形態３の処理の流れを図６に示す。ここで従来例の流れ図を示す図１１、実施の形態１の流れ図を示す図３、実施の形態２の流れ図を示す図５と同じ処理は同じ符号を用い説明は省略する。なお、実施の形態で使用するブロック図は、実施の形態１で使用した図１と同じものを用いる。

【００５０】ステップ１６では、ホストからゲイン、オフセット、シャッタスピードの受信を監視し、受信データがある場合データを受信する（ステップ１７）。ステップ１１では受信したゲイン、オフセット値、シャッタスピードを設定する。その後二値化回路出力の取り込み（ステップ２）、バーコードのデコード（ステップ３）を行い、デコードの成功／失敗に関わらずホストへデコードの成功または失敗を示す値、ゲイン、オフセット値、シャッタスピードをホストへ送信する（ステップ１８）。

【００５１】実施の形態１では、デコード成功時に、成功したゲイン、オフセット値、シャッタスピードを格納するようにしたが、実施の形態３では、デコード後、デコードの成功／失敗に関わらず、デコードの成功／失敗を示す値と、ゲイン、オフセット値、シャッタスピードをホストへ送信する。

【００５２】このような構成とした場合、デコードが成功するときのゲイン、オフセット値、シャッタスピードの組み合わせと、デコードが失敗するときのゲイン、オフセット値、シャッタスピードの組み合わせをホストでデータベース化することができ、デコードに失敗しても、過去に成功した組み合わせになるように、ゲイン、オフセット値、シャッタスピードを変更することによってデコードに成功する可能性が高い組み合わせを容易に設定することができ、読み取り時間を短縮することができる。また一般的に光学的読取装置よりもＰＣやＰＯＳなどホストの方が、ハードディスク等光学的記憶装置を

含めメモリ容量も多く、またＣＰＵの実行速度も速いため、大量のゲイン、オフセット値、シャタスピードの組み合わせをデータベースとし、最適な設定値を選択することが容易である。

【００５３】（実施の形態４）図７に本発明の実施の形態４の光学情報読取装置のブロック図を示す。ここで従来例のブロック図を示す図１０と、実施の形態１と実施の形態３のブロック図を示す図１と、実施の形態２のブロック図を示す図４と同じ部分は同じ符号を用い説明は省略する。

【００５４】右の破線で示すハンディターミナル部は、左の破線部で示す読み取り部にとってホストに相当する。２２は液晶やＣＲＴなどで構成される表示装置で、デコード結果や作業者への指示を表示する。２３はキー入力部で、数字などの入力の他、バーコードの読み取り指示、電源のオン／オフなどの指示も入力する。２４は電源制御部で、ハンディターミナル部のみならず、読み取り部の電源の制御や、内蔵電池（図示せず）の充電の制御なども行う。２１はメインＣＰＵで、読み取り部との通信機能や表示装置２２の制御、キー入力部２３からの入力処理、ＰＣやＰＯＳなどさらに上位のホストとの通信等を行っている。本発明の実施の形態４では、ＥＥＰＲＯＭ８をハンディターミナル部に配置した。これは従来からハンディターミナル部には、バーコードのデコード結果等を記憶しておくため、不揮発性メモリであるＥＥＰＲＯＭや電池でバックアップされたＳＲＡＭまたはＤＲＡＭが用いられているため、あらたに不揮発性メモリを設ける必要がないという理由からである。また読み取り部のＣＰＵ６とハンディターミナル部のメインＣＰＵ２１の間は、同一基板上であるため、通信Ｉ／Ｆ７を用いずに直接接続した。

【００５５】本発明の実施の形態４の処理の流れを図８、図９に示す。ここで従来例の流れ図を示す図１１、実施の形態１の流れ図を示す図３、実施の形態２の流れ図を示す図５、実施の形態３の流れ図を示す図６と同じ処理は同じ符号を用い説明は省略する。

【００５６】図８はハンディターミナル部の処理で、キー入力部２３からバーコードの読み取りキーの入力があった場合、ＥＥＰＲＯＭ８に格納されている前回のデコードの成否を示す値、前回のゲイン、前回のオフセット値、前回のシャッタスピードのデータを含むデータを読み取り部へ送信する（ステップ３０）。送信データには、読み取り部に読み取りを行わせる指令（コマンド）も含まれている。

【００５７】図９は読み取り部の処理で、ハンディターミナル部からのゲイン、オフセット値、シャッタスピードの受信を監視し（ステップ２０）、受信データがある場合データを受信する（ステップ２１）。受信したデータを解析し、受信したデータに読み取りを行わせる指令が含まれ、さらに前回のデコードが成功していた場合（ステップ１０）、受信した前回のゲイン、前回のオフセット値、前回のシャッタスピードを設定する（ステップ１１）。ステップ１０で受信データを解析し前回のデコードが失敗していた場合、受信した前回のゲイン、前回のオフセット値、前回のシャッタスピードの少なくともいずれか一つを変更して（ステップ５）、変更した値を設定する（ステップ１１）。その後二値化回路出力の取り込み（ステップ２）、バーコードのデコード（ステップ３）を行い、デコードの成功／失敗に関わらずハンディターミナル部へデコードの成功または失敗を示す値、ゲイン、オフセット値、シャッタスピードを送信する（ステップ２２）。

【００５８】ステップ２２で送信されたデータは、図８のハンディターミナル部のステップ３１で受信が監視され、ゲイン、オフセット値、シャッタスピードの受信データがある場合、読み取り部からデータを受信する（ステップ３２）。受信したデータには、デコードの成功または失敗を示す値、ゲイン、オフセット値、シャッタスピードが含まれており、それぞれをステップ３３、ステップ３４でＥＥＰＲＯＭ８に格納する。

【００５９】なお、図９のステップ１０とステップ５を削除し、実施の形態１の図３に示すようにステップ３の後にステップ４でデコードの成功／失敗を判断し、デコードが成功した場合はデコード時の設定値をハンディターミナル部へ送信し（ステップ２２）、失敗している場合ステップ５により設定値を変更した後、変更後の設定値をハンディターミナル部へ送信（ステップ２２）するようにしても構わない。

【００６０】また、図９のステップ１０とステップ５を削除し、ステップ２２でデコードの成功または失敗を示す値、ゲイン、オフセット値、シャッタスピードを送信し、ステップ５の代わりにハンディターミナル部でゲイン、オフセット値、シャッタスピードを変更する構成とすることもできる。

【００６１】実施の形態４のように、ハンドヘルドターミナルの場合、一般に電池駆動のため、消費電流を少なくする必要があり、読み取り時のみ読み取り部に電源を入れる。前回読み取りを行った時とバーコードの印字状態や周囲環境、特に周囲の明るさが同じで前回のデコードが成功した場合、デコード可能なゲイン、オフセット値、シャッタスピードがステップ１１で設定されるため、最初の設定でデコードを行うことができ、読み取り時間を短縮する効果がある。

【００６２】また、ハンディターミナル部では、従来から読み取ったバーコードデータ等を不揮発性メモリに格納していたため、ゲイン、オフセット値、シャッタスピードを格納するためには、数バイトのあらたな領域を確保するだけでよく、あらたに不揮発性メモリを増設する必要がないという効果もある。

【００６３】

【発明の効果】以上の説明から明らかなように、請求項1により、不揮発性メモリからなるゲイン格納手段により、例え装置の電源が切られたとしても、ゲイン制御回路のゲインを格納しておくことができる。これにより、読み取りを行っていないときに、消費電力を少なくするために電源をオフにしても、再開時には前回のゲインを読み出すことが可能になる。印字状態ならびに周囲環境が同じで、前回デコード成功していれば、最初の設定ゲインでデコードを行うことができ、消費電力の削減と、読み取り時間の短縮をする効果がある。

【００６４】請求項２により、不揮発性メモリからなるオフセット値格納手段により、例え装置の電源が切られたとしても、オフセット制御回路のオフセット値を格納しておくことができる。これにより、読み取りを行っていないときに、消費電力を少なくするために電源をオフにしても、再開時には前回のオフセット値を読み出すことが可能になる。印字状態ならびに周囲環境が同じで、前回デコード成功していれば、最初の設定オフセット値でデコードを行うことができ、消費電力の削減と、読み取り時間の短縮をする効果がある。

【００６５】請求項３により、不揮発性メモリからなるシャッタスピード格納手段により、例え装置の電源が切られたとしても、電子シャッタ制御手段のシャッタスピードを格納しておくことができる。これにより、読み取りを行っていないときに、消費電力を少なくするために電源をオフにしても、再開時には前回のシャッタスピードを読み出すことが可能になる。印字状態ならびに周囲環境が同じで、前回デコード成功していれば、最初の設定シャッタスピードでデコードを行うことができ、消費電力の削減と、読み取り時間の短縮をする効果がある。

【００６６】請求項４により、不揮発性メモリからなる読取成否結果格納手段により、例え装置の電源が切られたとしても、デコードの成功または失敗を示す値を格納しておくことができる。これにより、読み取りを行っていないときに、消費電力を少なくするために電源をオフにしても、読み取りの再開時に格納している成功または失敗を示す値を読み出すことが可能になり、前回のデコードが失敗している場合の処理と、成功している場合の処理を異なったものにすることができる。

【００６７】請求項８により、前回のデコードが成功している場合、前回デコード時のゲイン、オフセット値、シャッタスピードを設定した後、デコードをするため、印字状態ならびに周囲環境が前回のデコード時と同じであれば、最初の設定でデコードを行うことができ、消費電力の削減と、読み取り時間の短縮をする効果がある。また前回のデコードが失敗している場合でも、二値化出力の波形またはＡＤ変換器の出力波形に応じて設定値を変更しているので、初期値から設定するのに比べデコードが可能な設定値に近づいているため、デコードができるまでの設定回数が少なくて済み、読み取り時間の短縮をする効果がある。

【００６８】請求項９により、デコード後、デコードの成功または失敗を示す値、ゲイン、オフセット値、シャッタスピードの少なくとも何れかをホスト等へ送信することができ、読み取り部に、それら値を格納するためのメモリを設ける必要がないという効果がある。一般にＰＣやＰＯＳなどホストのメモリ容量は読み取り部よりも多く、また従来から、バックアップされたＳＲＡＭやＥＥＰＲＯＭなどいわゆる不揮発性メモリがホストに使用されていることが多く、あらたにそれら既存の不揮発性メモリ内に、それぞれの領域を設けるだけでよい。

【００６９】請求項１０により、光学情報読取装置は、ホストなどへ送信された前回デコード時のゲイン、オフセット値、シャッタスピードの少なくとも何れかをホストから受信し、それらの値を設定することができる。読み取り部に、それら値を格納するためのメモリを設ける必要がないという請求項９の効果とともに、前回デコードを行ったゲイン、オフセット値、シャッタスピードを設定することにより、前回のデコードが成功している場合、印字状態ならびに周囲環境が前回のデコード時と同じであれば、最初の設定でデコードを行うことができる。また前回のデコードが失敗している場合でも、二値化出力の波形またはＡＤ変換器の出力波形に応じて設定値を変更しているので、初期値から設定するのに比べデコードが可能な設定値に近づいているため、デコードができるまでの設定回数が少なくて済み、読み取り時間の短縮をする効果がある。

【図面の簡単な説明】

【図１】本発明の実施の形態１における光学情報読取装置のブロック図

【図２】本発明の実施の形態１～４における光学情報読取装置のＥＥＰＲＯＭの格納形式の一例の説明図

【図３】本発明の実施の形態１における光学情報読取装置の流れ図

【図４】本発明の実施の形態２における光学情報読取装置のブロック図

【図５】本発明の実施の形態２における光学情報読取装置の流れ図

【図６】本発明の実施の形態３における光学情報読取装置の流れ図

【図７】本発明の実施の形態４における光学情報読取装置のブロック図

【図８】本発明の実施の形態４における光学情報読取装置のハンディターミナル部の流れ図

【図９】本発明の実施の形態４における光学情報読取装置の読み取り部の流れ図

【図１０】従来の光学情報読取装置のブロック図

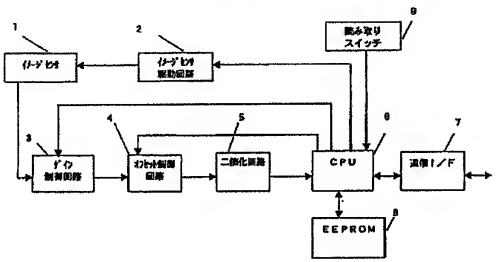
【図１１】従来の光学情報読取装置の流れ図

【図１２】プログラムメモリ内のゲイン、オフセット値、シャッタスピードの格納形式の一例の説明図

【符号の説明】

1　イメージセンサ
2　イメージセンサ駆動回路
3　ゲイン制御回路
4　オフセット制御回路
5　二値化回路
6　ＣＰＵ
7　通信Ｉ／Ｆ
8　ＥＥＰＲＯＭ
9　読み取りスイッチ
１０　ＡＤ変換器
１１　画像メモリ
２１　メインＣＰＵ
２２　表示装置
２３　キー入力部
２４　電源制御部

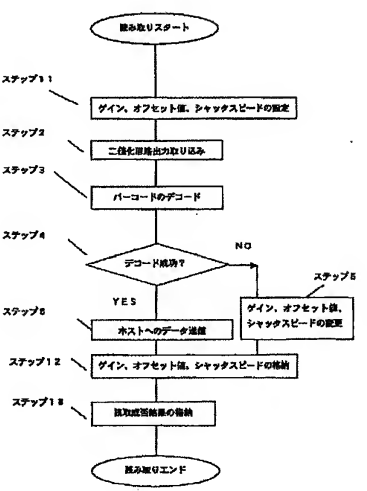
【図１】



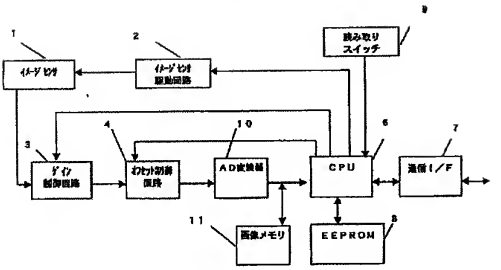
【図２】

アドレス	データ	
D000	A000	ゲイン格納領域
D001	B001	オフセット値格納領域
D002	CD05	シャッタスピード格納領域
D003	0001	読取成否結果格納領域

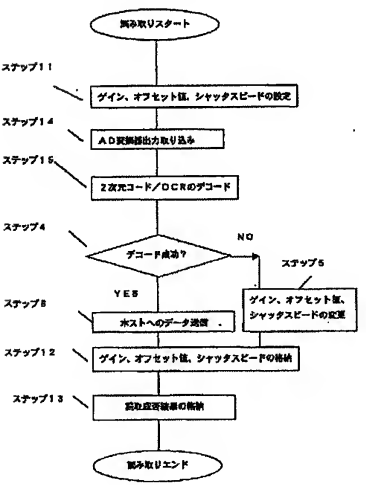
【図３】



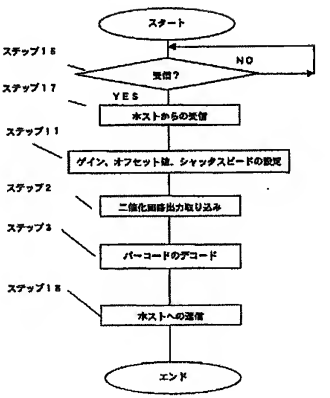
【図４】


1
2
9
読み取りスイッチ
イメージセンサ
イメージセンサ駆動回路
3
4
10
6
7
ゲイン制御回路
オフセット調整回路
AD変換器
CPU
通信I／F
11
8
画像メモリ
EEPROM

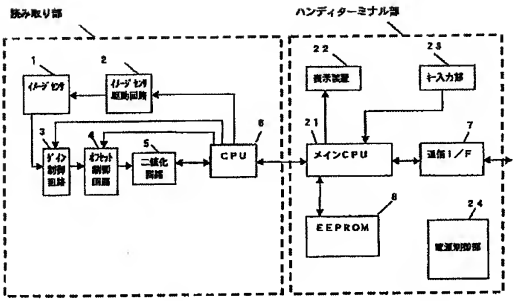
【図５】


読み取りスタート
ステップ11
ゲイン、オフセット値、シャックスピードの設定
ステップ14
AD変換器出力取り込み
ステップ15
２次元コード／OCRのデコード
ステップ4
デコード成功？
NO
ステップ5
YES
ステップ8
ホストへのデータ送信
ゲイン、オフセット値、シャックスピードの記憶
ステップ12
ゲイン、オフセット値、シャックスピードの格納
ステップ13
読み取り画像の格納
読み取りエンド

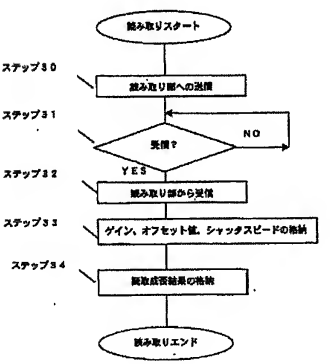
【図６】


スタート
ステップ16
NO
受信？
ステップ17
YES
ホストからの受信
ステップ11
ゲイン、オフセット値、シャックスピードの設定
ステップ2
二値化回路出力取り込み
ステップ3
バーコードのデコード
ステップ18
ホストへの送信
エンド

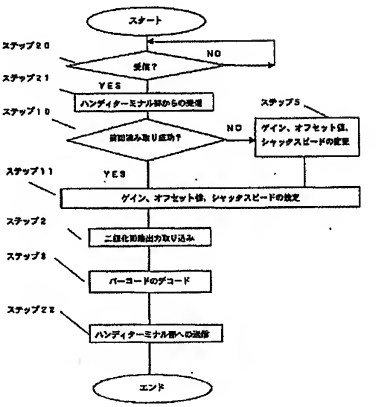
【図7】


読み取り部
ハンディターミナル部
1
イメージセンサ
2
イメージセンサ駆動回路
3
ゲイン制御回路
4
オフセット制御回路
5
二値化回路
6
CPU
21
メインCPU
22
表示装置
23
キー入力部
7
通信I／F
8
EEPROM
24
電源制御部

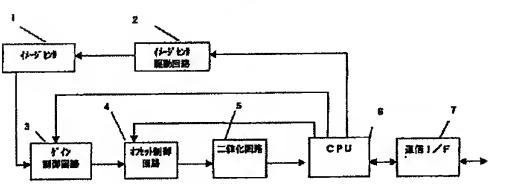
【図8】


読み取りスタート
ステップ30
読み取り部への送信
ステップ31
受信？
NO
YES
ステップ32
読み取り部から受信
ステップ33
ゲイン、オフセット値、シャッタスピードの格納
ステップ34
読取成否結果の格納
読み取りエンド

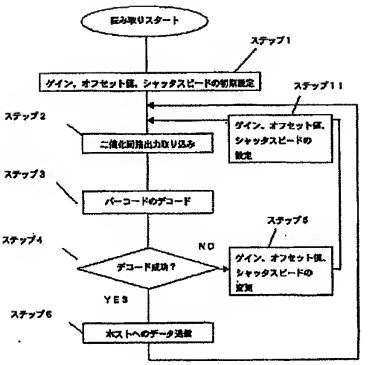
【図9】


スタート
ステップ20
受信？
NO
YES
ステップ21
ハンディターミナル部からの送信
ステップ10
前回読み取り成功？
NO
ステップ5
ゲイン、オフセット値、シャッタスピードの変更
YES
ステップ11
ゲイン、オフセット値、シャッタスピードの設定
ステップ2
二値化処理出力取り込み
ステップ3
バーコードのデコード
ステップ22
ハンディターミナル部への送信
エンド

【図10】


1
イメージセンサ
2
イメージセンサ駆動回路
3
ゲイン制御回路
4
オフセット制御回路
5
二値化回路
6
CPU
7
通信I／F

【図１１】



【図１２】

アドレス	データ
A000	ゲイン0
A001	ゲイン1
・	・・・
・	・ ・ ・
A00F	ゲイン15
・	・・・
・	・ ・ ・
B000	オフセット値0
B001	オフセット値1
・	・・・
・	・ ・ ・
B00F	オフセット値15
・	・・・
・	・ ・ ・
C000	シャッタスピード0
C001	シャッタスピード1
・	・・・
・	・ ・ ・
C00F	シャッタスピード15

フロントページの続き

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FF02 JJ01 JJ11 LL19
5J100 JA01 KA01 LA10 LA11 QA09

Machine Translation

Japanese Patent – 2001-307011

DETAILED DESCRIPTION
[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the optical information reader which reads signs, such as a bar code and a two dimensional code.
[0002]
[Description of the Prior Art]Hereafter, the bar code which used the one-dimensional (linear) image sensor especially for the image sensor among optical information readers is explained. This invention is not limited to a bar code reader, and A two dimensional code reader, A thing optically applicable [information] to the Personal Digital Assistant etc. which can be read like an OCR reader, a bar code reader integral-type handheld terminal, and a two dimensional code reader integral-type handheld terminal cannot be overemphasized.
[0003]The block diagram of the conventional bar code reader is shown in drawing 10. 1 is an image sensor and changes the catoptric light from a sign or its circumference into an electrical signal. 2 is an image sensor drive circuit, and while generating the timing which drives the image sensor 1, it has an electronic shutter function which can control shutter speed electrically. The image sensor drive circuit 2 may be built in CPU6 mentioned later when built in the image sensor 1. 3 amplifies the signal outputted from the image sensor 1 in a gain control circuit by the set-up gain. 4 offsets the voltage level of the signal amplified by the gain control circuit 3 in the offset control circuit up and down. The turn of the gain control circuit 3 and the offset control circuit 4 may be replaced. 5 changes the analog signal from the offset control circuit 4 into a digital signal in a binarization circuit. 6 is constituted from a CPU by the microprocessor and mainly decodes a bar code. Being built in CPU6 is illustrating neither much program memory in which the execution program of CPU6 is stored, nor many work memories required for execution. CPU6 controls shutter speed by changing the timing outputted from the gain control of the gain control circuit 3, control of the offset value of the offset control circuit 4, and the image sensor drive circuit 2. The data decoded by CPU6 is transmitted to hosts, such as POS and PC, etc. through communication I/F (communication interface) of 7.
[0004]Decoding is also called decipherment processing or recognition processing, and although it is processing which recognizes signs, such as a bar code, from a digital signal strictly (decipherment), generally it is also only called reading processing. Decoding puts the thing of the decipherment (recognition) processing by CPU with the text, and reading processing means in it various setting out of initial setting etc., and the whole processing required for reading including communication and decoding.
[0005]Next, the flow of the reading processing of a conventional example is shown in drawing 11. Step 1 is the initialization processing of a gain, an offset value, and shutter speed, and CPU6 sets the gain programmed beforehand, an

offset value, and each initialized value of shutter speed as the gain control circuit 3, the offset control circuit 4, and the image sensor drive circuit 2. Step 2 is binarization circuit output incorporation processing, and CPU6 incorporates the output signal from the image sensor 1 via the gain control circuit 3, the offset control circuit 4, and the binarization circuit 5. Step 3 is decoding of a bar code and CPU6 decodes the incorporated digital signal based on the decode algorithm of a bar code. When decoding is successful by decoding (Step 4), after transmitting a decoded result to hosts, such as external PC and POS, via communication I/F7 (Step 6), the next binarization circuit output incorporation is performed.

[0006]On the other hand, when decoding goes wrong, any at least one of a gain, an offset value, and the shutter speed is changed (Step 5), After setting the changed value as the gain control circuit 3, the offset control circuit 4, and the image sensor drive circuit 2 (Step 11), the next binarization circuit output incorporation is performed.

[0007]The table (table) of the gain beforehand stored in program memory, an offset value, and shutter speed is shown in drawing 12. It is Step 1 of drawing 11 and the data (the gain 0, the offset value 0, the shutter speed 0) in which a gain, an offset value, and shutter speed were stored in the address (A000, B000, C000), respectively is set up, for example as an initial value. When decoding is not successful, as Step 5 of drawing 11 shows, any at least one preset value is changed among a gain, an offset value, and shutter speed, and the next binarization circuit output incorporation is performed.

[0008]The case where the power is turned off, when the reading switch (not shown) was formed and the switch was turned OFF, or when the reading time beforehand set up with the timer etc. passes, reading is completed compulsorily.

[0009]

[Problem(s) to be Solved by the Invention]Only when it is requested that the consumed electric current is lessened as much as possible and it reads from a viewpoint of energy saving by the bar code reader or a two dimensional code reader in recent years, energizing the power supply of a reader is performed.

[0010]In use in the environment which is separated from hosts who connect, such as a factory and in the car, the portable optical reader generally called a handheld terminal is often used. In order that a handheld terminal may lengthen a hour of use by a battery drive, a power supply is controlled as much as possible, and there is especially the necessity of lessening the consumed electric current. Therefore, the power supply of the portion about reading is energized at every reading, that is, turning OFF the power supply of the portion about reading is performed in addition to the time of reading.

[0011]However, in the processing shown in the flow chart of drawing 11, once the power supply of a reader is disconnected, again to a power up. Until it reaches a preset value in which decoding succeeds, when it must redo from initial setting of the gain of Step 1, an offset value, and shutter speed and decoding fails in an initial value, Change of a gain, an offset value, and shutter speed is necessity once at least at Step 5, and SUBJECT that it would take time before reading is successful occurred. When a bar code with narrow range of the gain which can

be decoded especially, range of an offset value, and range of shutter speed, for example, a bar code, and the contrast of the circumference of it read a bad thing, Since there was little combination of setting out of the gain which can be decoded, an offset value, and shutter speed and change of a gain, an offset value, and shutter speed was needed by setting out of the optimal preset value repeatedly, SUBJECT that it took time until reading is successful dramatically occurred.

[0012]Since the reading port is intercepting outdoor daylight in the case of the optical reader of the type contacted and read on the label which furthermore contains signs, such as a bar code, It was rare to receive the influence of change of the surrounding reading environment, and when setting up the gain optimal at the time of manufacture, an offset value, and shutter speed, it did not need to change after that in many cases. However, the optical readers of the type which is detached and is read in the label containing a sign focusing on a two dimensional code reader in recent years have increased in number. Since this type of case received the influence of surrounding outdoor daylight in the label directly, SUBJECT that it was necessary to design the step of a preset value finely greatly [range / which can be set up], took time setting out of the preset value which can be decoded, and took time until decoding is successful dramatically occurred.

[0013]This invention solves such SUBJECT and it aims at providing the optical information reader in which high-speed reading is possible.

[0014]

[Means for Solving the Problem]In order to attain the above purpose the 1st optical information reader of this invention, An image sensor which incorporates catoptric light from a sign and is changed into an electrical signal, A gain control means by which a gain which amplifies an electrical signal from said image sensor can be set up, A binarization means which carries out binarization of the electrical signal amplified by A/D converter which changes into a digital signal an electrical signal amplified by said gain control means, or said gain control means, It has a decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, and a gain storing means which stores a gain of said gain control means in nonvolatile memory which can back up electrically.

[0015]An image sensor which the 2nd optical information reader incorporates catoptric light from a sign, and is changed into an electrical signal, An offset control means which can set up an offset value of an electrical signal from said image sensor, A binarization means which carries out binarization of the electrical signal offset by an A/D converter which changes into a digital signal an electrical signal offset by said offset control means, or said offset control means, A decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, It has an offset value storing means which stores an offset value of said offset control means in nonvolatile memory which can back up electrically.

[0016]An image sensor which the 3rd optical information reader incorporates catoptric light from a sign, and is changed into an electrical signal, An electronic

shutter control means which can set up shutter speed of said image sensor, A binarization means which carries out binarization of an A/D converter which changes an electrical signal from said image sensor into a digital signal, or the electrical signal from said image sensor, A decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, It has a shutter speed storing means which stores electrically shutter speed of said electronic shutter control means in nonvolatile memory which can back up.
[0017]The 4th optical information reader has after decoding a reading success-or-failure result storing means which stores electrically a value which shows a success or failure of decoding in nonvolatile memory which can back up.
[0018]The 5th optical information reader has after decoding a gain storing means which stores a gain at the time of decoding in nonvolatile memory which can back up electrically.
[0019]The 6th optical information reader has after decoding an offset value storing means which stores an offset value at the time of decoding in nonvolatile memory which can back up electrically.
[0020]The 7th optical information reader has after decoding a shutter speed storing means which stores shutter speed at the time of decoding in nonvolatile memory which can back up electrically.
[0021]The 8th optical information reader has a setting-out means to set up shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding, when the last decoding is successful.
[0022]The 9th optical information reader has a transmitting means which transmits after decoding shutter speed at the time of a value which shows a success or failure of decoding and/or a gain at the time of decoding and/or an offset value at the time of decoding and/, or decoding to a host etc.
[0023]A value the 10th optical information reader indicates the last success or failure of decoding transmitted to a host etc. by said transmitting means to be, A reception means which receives shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding from a host etc., It has a setting-out means to set up shutter speed at the time of a gain at the time of decoding and/or an offset value at the time of the last decoding and/, or the last decoding.
[0024]When a value which shows the last success or failure of decoding which the 11th optical information reader received by said reception means shows a success, It has a setting-out means to set up shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding.
[0025]
[Embodiment of the Invention]By it, the 1st optical information reader can store the gain of a gain control circuit, even if a metaphor reader is turned off by the above-mentioned composition by the gain storing means which consists of nonvolatile memory which can back up electrically.
[0026]By the offset value storing means which consists of nonvolatile memory

which can back up electrically, the 2nd optical information reader can store the offset value of an offset control circuit, even if a metaphor reader is turned off.
[0027]By the shutter speed storing means which consists of nonvolatile memory which can back up electrically, the 3rd optical information reader can store the shutter speed of an electronic shutter control means, even if a metaphor reader is turned off.
[0028]By the reading success-or-failure result storing means which consists of nonvolatile memory which can back up electrically, the 4th optical information reader can store the value which shows a success or failure of decoding, even if a metaphor reader is turned off.
[0029]When the last decoding is successful, the 8th optical information reader can carry out decoding, after [the gain at the time of the last decoding, an offset value, and shutter speed] setting up at least any they are.
[0030]After decoding, even if the 9th optical information reader has little a value which shows a success or failure of decoding, gain, offset value, and shutter speed, it can transmit any they are to a host etc.
[0031]The 10th optical information reader can receive any at least one of the gain at the time of decoding, an offset value, and the shutter speed from a host last time which was transmitted to the host etc., and can set up those values.
[0032]Hereafter, an embodiment of the invention is described, referring to a figure.
[0033](Embodiment 1) The block diagram of the optical information reader of the embodiment of the invention 1 is shown in drawing 1. Explanation is omitted using the numerals with the same, same portion as drawing 10 in which the block diagram of a conventional example is shown here.
[0034]8 used eliminable EEPROM with the gestalt of this invention electrically as nonvolatile memory. Nonvolatile memory is not limited to EEPROM and contains a ferroelectric memory (FeRAM), and SRAM and DRAM which were backed up by the cell. By the nonvolatile memory 8, even when a reader is turned off, the data memorized in the memory can be held.
[0035]9 reads and is a switch, and if one [a reading switch], CPU6 will perform reading processing. Even if it constitutes a reading switch so that reading may be ended when reading is performed and it turns OFF while one, it is not cared about as composition which does not matter as composition which will read once once one [a switch], and performs predetermined number-of-times reading. The reading switch 9 may not certainly be required and the reading instructions by the communication from a host may be sufficient as it.
[0036]Drawing 2 is the storing form of EEPROM8 an example to express, and A gain storing region, It is divided into the offset value storing region, the shutter speed storing region, and the reading success-or-failure result storing region, and after decoding a gain, an offset value, and the value that shows the preset value and reading success-or-failure result of shutter speed, respectively, it stores. In the embodiment of the invention 1, the success-or-failure result of the address of the gain at the time of decoding, an offset value, and the preset value of shutter speed and decoding is stored in EEPROM8 at the time of a success of decoding. After a gain, an offset value, or shutter speed is changed according to

the output of a binarization circuit at the time of failure of decoding, the address of a gain, an offset value, and the preset value of shutter speed and the success-or-failure result of decoding are stored in EEPROM8.
[0037]In the example of drawing 2, a gain to the address (D000, D001, D002) of EEPROM8. The address (A000, B001, C005) of the gain, the offset value, and the preset value of shutter speed is stored as data, and a success/failure of decoding are stored in the address (D003) as a flag. Data (0000) is written in an address (D003) at the time of failure of data (0001) and decoding at the time of a success of decoding.
[0038]Next, the flow of processing of the embodiment of the invention 1 is shown in drawing 3. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here.
[0039]Step 11 is a setting-out means and sets the gain, the offset value, and shutter speed which were stored last time as the gain control circuit 3, the offset control circuit 5, and the image sensor drive circuit 2, respectively. When the data shown in drawing 2 is specifically stored, CPU6 sets up the preset value (the gain 0, the offset value 1, the shutter speed 5) which makes an address the data (A000, B001, C005) stored in the address (D000, D001, D002), and it follows it to Step 2. When decoding is successful, to a host After data transmission (Step 6), a gain, An offset value and shutter speed are stored in the address (D000, D001, D002) of EEPROM8, respectively (Step 12), The data (0001) in which a decoding success is shown after that is stored in the address (D003) of EEPROM8 (Step 13), and reading processing is ended. When decoding goes wrong, do not transmit data to a host but according to the output of a binarization circuit, At least one of a gain, an offset value, and the shutter speed is changed (Step 5), The changed preset value is stored in the address (D000, D001, D002) of EEPROM8, respectively (Step 12), the data (0000) in which decoding failure is shown after that is stored in the address (D003) of EEPROM8 (Step 13), reading processing is ended, and a power supply is disconnected.
[0040]Concretely, when there are many values the output of a binarization circuit indicates black to be when decoding goes wrong, or when it is judged that the period which shows black is long, it is judged that a binarization output is small and an offset value and a gain are raised at Step 5. Conversely, when there is much white, an offset value and a gain are lowered.
[0041]Thus, in order to lessen the consumed electric current, when putting a power supply into a reader only at the time of reading, the luminosity of the printing condition and ambient environment of the time of reading last time and a bar code, especially the circumference is the same, Since the gain, the offset value, and shutter speed which can be decoded are set up at Step 11 when the last decoding is successful, it can decode by the first setting out after powering on, and is effective in shortening reading time.
[0042]Even if it generally reads, it is almost the same in many cases if ambient environment, such as a luminosity at the time, is the interior of a room, and it is the outdoors, it changes gently in many cases, without changing suddenly.
[0043]If the bar code beforehand printed by the bag and the container is

removed, in a factory or a warehouse, the code used in the transportation industry is printed black, and the almost same thing can decode a printing condition in many cases with the gain, the offset value, and shutter speed which there were and were successful by the last decoding. [much]

[0044](Embodiment 2) Although the device which reads a bar code was used as a sign in Embodiment 1, it is clear that a sign is not limited to a bar code but a two dimensional code and OCR are also included. The block diagram of the optical information reader of the embodiment of the invention 2 which is a device which reads a two dimensional code and OCR is shown in drawing 4. 10 changes an analog signal into the digital value of 8 bits instead of the binarization circuit 5 of drawing 1 by an A/D converter. Area image sensors, such as area CCD, are used for the image sensor 1. Since the output of an area image sensor has data in the direction of two dimensions, In the binarization circuit 5 which was being used with the bar code reader of a conventional example or Embodiment 1, since it is influenced by shading etc. and binarization cannot be carried out correctly, A/D converter 10 is used, it is changed into the digital signal which is 8 bits, and binarization processing is performed by CPU6. 11 is an image memory, and there are usually many pixels of an area image sensor as about 330,000 pixels, and since they generally cannot build a memory in CPU6, they are constituted from SRAM or a DRAM by the exterior of CPU6. CPU6 decodes the data of the image memory 11. The DMA (Direct Memory Access) circuit for storing the output of A/D converter 10 in the image memory 11 is not illustrated. An area CCD or CMOS type area image sensor is also available for the image sensor 1.

[0045]Next, the flow of processing of the embodiment of the invention 2 is shown in drawing 5. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here, and drawing 3 in which the flow chart of the embodiment of the invention 1 is shown.

[0046]Step 14 is the processing which incorporates the output of A/D converter 10 into the image memory 11, and progresses to decoding of a two dimensional code or OCR after the end of incorporation (Step 15).

[0047]When an area image sensor is used for the image sensor 1, since there are many pixel numbers, it takes time processing of Step 14 in which the output of A/D converter 10 is incorporated. Furthermore, as for the two dimensional code of Step 15, or decoding of OCR, in order that CPU6 may perform binarization processing in soft in addition to there being many data numbers, one decoding takes time. Therefore, in [when the last decoding is successful] next decoding, Since the last gain, offset, and the conditioning of shutter speed can be used as it is if the printing conditions and ambient environment of a two dimensional code or OCR are the same conditions, certain and the effect of decoding being possible for a short time, explaining and depending by Embodiment 1, and shortening reading time are large.

[0048]The storing form to the memory of a gain, an offset value, shutter speed, and a reading success-or-failure result presupposed that it is the same as drawing 2 shown by Embodiment 1.

[0049](Embodiment 3) The flow of the processing of the embodiment of the invention 3 to the next is shown in drawing 6. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here, drawing 3 in which the flow chart of Embodiment 1 is shown, and drawing 5 in which the flow chart of Embodiment 2 is shown. The same thing as drawing 1 used by Embodiment 1 is used for the block diagram used by an embodiment.
[0050]In Step 16, a gain, offset, and reception of shutter speed are supervised from a host, and when there are received data, data is received (Step 17). At Step 11, the gain, the offset value, and shutter speed which were received are set up. Incorporation (Step 2) of a binarization circuit output and decoding (Step 3) of a bar code are performed after that, and the value, the gain, the offset value, and shutter speed which are not concerned with a success/failure of decoding, but show a success or failure of decoding to a host are transmitted to a host (Step 18).
[0051]Although successful gain, offset value, and shutter speed were stored in Embodiment 1 at the time of a decoding success, According to Embodiment 3, it is not concerned with a success/failure of decoding after decoding, but the value which shows a success/failure of decoding, a gain and an offset value, and shutter speed are transmitted to a host.
[0052]A gain when it has such composition, in case decoding is successful, an offset value, and the combination of shutter speed, Even if the combination of a gain in case decoding goes wrong, an offset value, and shutter speed can be put in a database by a host and decoding goes wrong, By changing a gain, an offset value, and shutter speed, a possibility of succeeding in decoding can set up a high combination easily, and can shorten reading time so that it may become the combination which was successful in the past. Since memory space also has many hosts, such as PC and POS, including optical storage devices, such as a hard disk, and the execution speed of CPU generally also has it, [quicker than an optical reader] It is easy to use combination of a lot of gains, offset values, and SHATA speeds as a database, and to choose the optimal preset value.
[0053](Embodiment 4) The block diagram of the optical information reader of the embodiment of the invention 4 is shown in drawing 7. Explanation is omitted using the numerals with the same, same portion as drawing 10 in which the block diagram of a conventional example is shown here, drawing 1 in which the block diagram of Embodiment 1 and Embodiment 3 is shown, and drawing 4 in which the block diagram of Embodiment 2 is shown.
[0054]A host deserves the handy terminal part shown with a right dashed line for the reading part shown in a left dashed line part. 22 is a display which comprises a liquid crystal, CRT, etc., and displays the directions to a decoded result or a worker. 23 is a key input section and also inputs directions of reading directions of a bar code besides the input of a number etc., ON and OFF of a power supply, etc. 24 is control power supply and performs not only a handy terminal part but control of the power supply of a reading part, control of charge of an internal battery (not shown), etc. 21 is main CPU and a communication function with a reading part, control of the display 22, the input process from the key input

section 23, PC, POS, etc. are performing communication with the host of a higher rank, etc. further. In the embodiment of the invention 4, EEPROM8 has been arranged in the handy terminal part. In order that this may memorize the decoded result of the bar code, etc. in the handy terminal part from the former, Since SRAM or DRAM backed up by EEPROM which is nonvolatile memory, or the cell is used, it is from the reason for newly not providing nonvolatile memory. Since it was on the same board, direct continuation of between CPU6 of a reading part and main CPU21 of a handy terminal part was carried out without using communication I/F7.

[0055]The flow of processing of the embodiment of the invention 4 is shown in drawing 8 and drawing 9. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here, drawing 3 in which the flow chart of Embodiment 1 is shown, drawing 5 in which the flow chart of Embodiment 2 is shown, and drawing 6 in which the flow chart of Embodiment 3 is shown.

[0056]When drawing 8 is processing of a handy terminal part and there is an input of the reading key of a bar code from the key input section 23, The data containing the data of the value which shows the success or failure of the last decoding stored in EEPROM8, the last gain, the last offset value, and the last shutter speed is transmitted to a reading part (Step 30). The instructions (command) which make it read to a reading part are also included in send data.

[0057]Drawing 9 is processing of a reading part, supervises reception of the gain from a handy terminal part, an offset value, and shutter speed (Step 20), and when there are received data, it receives data (Step 21). When the instructions which analyze the received data and make it read to the received data are included and the further last decoding is successful (Step 10), the received last gain, the last offset value, and the last shutter speed are set up (Step 11). When received data are analyzed at Step 10 and the last decoding has gone wrong, any at least one of the received last gain, the last offset value, and the last shutter speed is changed (Step 5), and the changed value is set up (Step 11). Incorporation (Step 2) of a binarization circuit output and decoding (Step 3) of a bar code are performed after that, and the value, the gain, the offset value, and shutter speed which are not concerned with a success/failure of decoding, but show a success or failure of decoding to a handy terminal part are transmitted (Step 22).

[0058]When reception is supervised at Step 31 of the handy terminal part of drawing 8 and the data transmitted at Step 22 has the received data of a gain, an offset value, and shutter speed, data is received from a reading part (Step 32). The value, the gain, the offset value, and shutter speed which show a success or failure of decoding are contained in the received data, and each is stored in EEPROM8 at Step 33 and Step 34.

[0059]Delete Step 10 and Step 5 of drawing 9, and as shown in drawing 3 of Embodiment 1, a success/failure of decoding are judged at Step 4 after Step 3, When transmitting the preset value at the time of decoding to a handy terminal part when decoding is successful (Step 22), and having failed, after changing a preset value by Step 5, it may be made to transmit the preset value after change

to a handy terminal part (Step 22).
[0060]The value which deletes Step 10 and Step 5 of drawing 9, and shows a success or failure of decoding at Step 22, A gain, an offset value, and shutter speed can be transmitted and it can also have composition which changes a gain, an offset value, and shutter speed in a handy terminal part instead of Step 5.
[0061]It is necessary to lessen the consumed electric current, and, in the case of a handheld terminal, generally, a power supply is put into a reading part like Embodiment 4 only at the time of reading for a battery drive. Since the gain, the offset value, and shutter speed which can be decoded are set up at Step 11 when the last decoding with same luminosity of the printing condition and ambient environment of the time of reading last time and a bar code, especially the circumference is successful, It can decode by the first setting out and is effective in shortening reading time.
[0062]Since the bar code data etc. which were read in the former were stored in nonvolatile memory in the handy terminal part, in order to store a gain, an offset value, and shutter speed, What is necessary is just to secure several bytes of new field, and it is effective in newly not extending nonvolatile memory.
[0063]
[Effect of the Invention]Even if a metaphor device is turned off by the gain storing means which consists of nonvolatile memory by claim 1 so that clearly from the above explanation, the gain of a gain control circuit is storable. Thereby, while not reading, in order to lessen power consumption, even if it turns OFF a power supply, it becomes possible to read the last gain at the time of resumption. A printing condition and ambient environment are the same, if a decoding success is carried out last time, it can decode by the first setting-out gain, and there is an effect which carries out reduction of power consumption and shortening of reading time.
[0064]By the offset value storing means which consists of nonvolatile memory by claim 2, even if a metaphor device is turned off, the offset value of an offset control circuit is storable. Thereby, while not reading, in order to lessen power consumption, even if it turns OFF a power supply, it becomes possible to read the last offset value at the time of resumption. A printing condition and ambient environment are the same, if a decoding success is carried out last time, it can decode with the first setting-out offset value, and there is an effect which carries out reduction of power consumption and shortening of reading time.
[0065]By the shutter speed storing means which consists of nonvolatile memory by claim 3, even if a metaphor device is turned off, the shutter speed of an electronic shutter control means is storable. Thereby, while not reading, in order to lessen power consumption, even if it turns OFF a power supply, it becomes possible to read the last shutter speed at the time of resumption. A printing condition and ambient environment are the same, if a decoding success is carried out last time, it can decode with the first setting-out shutter speed, and there is an effect which carries out reduction of power consumption and shortening of reading time.
[0066]By the reading success-or-failure result storing means which consists of

nonvolatile memory by claim 4, even if a metaphor device is turned off, the value which shows a success or failure of decoding is storable. Even if it turns OFF a power supply by this in order to lessen power consumption while not reading, It becomes possible to read the value which shows a success or failure stored at the time of resumption of reading, and processing when the last decoding has gone wrong, and processing in the case of having succeeded can be made into a different thing.

[0067]In order to carry out decoding after setting up the gain at the time of the last decoding, an offset value, and shutter speed when the last decoding is successful by claim 8, If a printing condition and ambient environment are the same as the time of the last decoding, it can decode by the first setting out and there is an effect which carries out reduction of power consumption and shortening of reading time. Since the preset value is changed according to the waveform of a binarization output, or the output wave of an A/D converter even when the last decoding has gone wrong, Since the preset value which can be decoded compared with setting up from an initial value is approached, there are few predetermined numbers until decoding is possible, and they end, and it is effective in shortening reading time.

[0068]It is effective in not providing the memory for [of the value which shows a success or failure of decoding after decoding, a gain, an offset value, and shutter speed] being able to transmit at least any they are to a host etc., and storing these values in a reading part by claim 9. Generally there is more memory space of hosts, such as PC and POS, than a reading part, What is necessary is just to use what is called nonvolatile memory, such as SRAM, EEPROM, etc. which were backed up, for the host in many cases, and to newly provide each field in the nonvolatile memory of these existing from the former.

[0069]By claim 10, even if an optical information reader has little gain at the time of decoding, offset value, and shutter speed last time which was transmitted to the host etc., it can receive from a host any they are, and can set up those values. With the effect of claim 9 that it is not necessary to provide the memory for storing these values in a reading part. If a printing condition and ambient environment are the same as the time of the last decoding when the last decoding is successful by setting up the gain, the offset value, and shutter speed which decoded last time, it can decode by the first setting out. Since the preset value is changed according to the waveform of a binarization output, or the output wave of an A/D converter even when the last decoding has gone wrong, Since the preset value which can be decoded compared with setting up from an initial value is approached, there are few predetermined numbers until decoding is possible, and they end, and it is effective in shortening reading time.

TECHNICAL FIELD

[Field of the Invention]This invention relates to the optical information reader which reads signs, such as a bar code and a two dimensional code.

PRIOR ART

[Description of the Prior Art]Hereafter, the bar code which used the one-dimensional (linear) image sensor especially for the image sensor among optical information readers is explained. This invention is not limited to a bar code reader, and A two dimensional code reader, A thing optically applicable [information] to the Personal Digital Assistant etc. which can be read like an OCR reader, a bar code reader integral-type handheld terminal, and a two dimensional code reader integral-type handheld terminal cannot be overemphasized.
[0003]The block diagram of the conventional bar code reader is shown in drawing 10. 1 is an image sensor and changes the catoptric light from a sign or its circumference into an electrical signal. 2 is an image sensor drive circuit, and while generating the timing which drives the image sensor 1, it has an electronic shutter function which can control shutter speed electrically. The image sensor drive circuit 2 may be built in CPU6 mentioned later when built in the image sensor 1. 3 amplifies the signal outputted from the image sensor 1 in a gain control circuit by the set-up gain. 4 offsets the voltage level of the signal amplified by the gain control circuit 3 in the offset control circuit up and down. The turn of the gain control circuit 3 and the offset control circuit 4 may be replaced. 5 changes the analog signal from the offset control circuit 4 into a digital signal in a binarization circuit. 6 is constituted from a CPU by the microprocessor and mainly decodes a bar code. Being built in CPU6 is illustrating neither much program memory in which the execution program of CPU6 is stored, nor many work memories required for execution. CPU6 controls shutter speed by changing the timing outputted from the gain control of the gain control circuit 3, control of the offset value of the offset control circuit 4, and the image sensor drive circuit 2. The data decoded by CPU6 is transmitted to hosts, such as POS and PC, etc. through communication I/F (communication interface) of 7.
[0004]Decoding is also called decipherment processing or recognition processing, and although it is processing which recognizes signs, such as a bar code, from a digital signal strictly (decipherment), generally it is also only called reading processing. Decoding puts the thing of the decipherment (recognition) processing by CPU with the text, and reading processing means in it various setting out of initial setting etc., and the whole processing required for reading including communication and decoding.
[0005]Next, the flow of the reading processing of a conventional example is shown in drawing 11. Step 1 is the initialization processing of a gain, an offset value, and shutter speed, and CPU6 sets the gain programmed beforehand, an offset value, and each initialized value of shutter speed as the gain control circuit 3, the offset control circuit 4, and the image sensor drive circuit 2. Step 2 is binarization circuit output incorporation processing, and CPU6 incorporates the output signal from the image sensor 1 via the gain control circuit 3, the offset control circuit 4, and the binarization circuit 5. Step 3 is decoding of a bar code and CPU6 decodes the incorporated digital signal based on the decode algorithm of a bar code. When decoding is successful by decoding (Step 4), after transmitting a decoded result to hosts, such as external PC and POS, via communication I/F7 (Step 6), the next binarization circuit output incorporation is performed.

[0006]On the other hand, when decoding goes wrong, any at least one of a gain, an offset value, and the shutter speed is changed (Step 5), After setting the changed value as the gain control circuit 3, the offset control circuit 4, and the image sensor drive circuit 2 (Step 11), the next binarization circuit output incorporation is performed.
[0007]The table (table) of the gain beforehand stored in program memory, an offset value, and shutter speed is shown in drawing 12. It is Step 1 of drawing 11 and the data (the gain 0, the offset value 0, the shutter speed 0) in which a gain, an offset value, and shutter speed were stored in the address (A000, B000, C000), respectively is set up, for example as an initial value. When decoding is not successful, as Step 5 of drawing 11 shows, any at least one preset value is changed among a gain, an offset value, and shutter speed, and the next binarization circuit output incorporation is performed.
[0008]The case where the power is turned off, when the reading switch (not shown) was formed and the switch was turned OFF, or when the reading time beforehand set up with the timer etc. passes, reading is completed compulsorily.

EFFECT OF THE INVENTION
[Effect of the Invention]Even if a metaphor device is turned off by the gain storing means which consists of nonvolatile memory by claim 1 so that clearly from the above explanation, the gain of a gain control circuit is storable. Thereby, while not reading, in order to lessen power consumption, even if it turns OFF a power supply, it becomes possible to read the last gain at the time of resumption. A printing condition and ambient environment are the same, if a decoding success is carried out last time, it can decode by the first setting-out gain, and there is an effect which carries out reduction of power consumption and shortening of reading time.
[0064]By the offset value storing means which consists of nonvolatile memory by claim 2, even if a metaphor device is turned off, the offset value of an offset control circuit is storable. Thereby, while not reading, in order to lessen power consumption, even if it turns OFF a power supply, it becomes possible to read the last offset value at the time of resumption. A printing condition and ambient environment are the same, if a decoding success is carried out last time, it can decode with the first setting-out offset value, and there is an effect which carries out reduction of power consumption and shortening of reading time.
[0065]By the shutter speed storing means which consists of nonvolatile memory by claim 3, even if a metaphor device is turned off, the shutter speed of an electronic shutter control means is storable. Thereby, while not reading, in order to lessen power consumption, even if it turns OFF a power supply, it becomes possible to read the last shutter speed at the time of resumption. A printing condition and ambient environment are the same, if a decoding success is carried out last time, it can decode with the first setting-out shutter speed, and there is an effect which carries out reduction of power consumption and shortening of reading time.
[0066]By the reading success-or-failure result storing means which consists of nonvolatile memory by claim 4, even if a metaphor device is turned off, the value

which shows a success or failure of decoding is storable. Even if it turns OFF a power supply by this in order to lessen power consumption while not reading, It becomes possible to read the value which shows a success or failure stored at the time of resumption of reading, and processing when the last decoding has gone wrong, and processing in the case of having succeeded can be made into a different thing.

[0067]In order to carry out decoding after setting up the gain at the time of the last decoding, an offset value, and shutter speed when the last decoding is successful by claim 8, If a printing condition and ambient environment are the same as the time of the last decoding, it can decode by the first setting out and there is an effect which carries out reduction of power consumption and shortening of reading time. Since the preset value is changed according to the waveform of a binarization output, or the output wave of an A/D converter even when the last decoding has gone wrong, Since the preset value which can be decoded compared with setting up from an initial value is approached, there are few predetermined numbers until decoding is possible, and they end, and it is effective in shortening reading time.

[0068]It is effective in not providing the memory for [of the value which shows a success or failure of decoding after decoding, a gain, an offset value, and shutter speed] being able to transmit at least any they are to a host etc., and storing these values in a reading part by claim 9. Generally there is more memory space of hosts, such as PC and POS, than a reading part, What is necessary is just to use what is called nonvolatile memory, such as SRAM, EEPROM, etc. which were backed up, for the host in many cases, and to newly provide each field in the nonvolatile memory of these existing from the former.

[0069]By claim 10, even if an optical information reader has little gain at the time of decoding, offset value, and shutter speed last time which was transmitted to the host etc., it can receive from a host any they are, and can set up those values. With the effect of claim 9 that it is not necessary to provide the memory for storing these values in a reading part. If a printing condition and ambient environment are the same as the time of the last decoding when the last decoding is successful by setting up the gain, the offset value, and shutter speed which decoded last time, it can decode by the first setting out. Since the preset value is changed according to the waveform of a binarization output, or the output wave of an A/D converter even when the last decoding has gone wrong, Since the preset value which can be decoded compared with setting up from an initial value is approached, there are few predetermined numbers until decoding is possible, and they end, and it is effective in shortening reading time.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]Only when it is requested that the consumed electric current is lessened as much as possible and it reads from a viewpoint of energy saving by the bar code reader or a two dimensional code reader in recent years, energizing the power supply of a reader is performed.

[0010]In use in the environment which is separated from hosts who connect, such as a factory and in the car, the portable optical reader generally called a

handheld terminal is often used. In order that a handheld terminal may lengthen a hour of use by a battery drive, a power supply is controlled as much as possible, and there is especially the necessity of lessening the consumed electric current. Therefore, the power supply of the portion about reading is energized at every reading, that is, turning OFF the power supply of the portion about reading is performed in addition to the time of reading.

[0011]However, in the processing shown in the flow chart of drawing 11, once the power supply of a reader is disconnected, again to a power up. Until it reaches a preset value in which decoding succeeds, when it must redo from initial setting of the gain of Step 1, an offset value, and shutter speed and decoding fails in an initial value, Change of a gain, an offset value, and shutter speed is necessity once at least at Step 5, and SUBJECT that it would take time before reading is successful occurred. When a bar code with narrow range of the gain which can be decoded especially, range of an offset value, and range of shutter speed, for example, a bar code, and the contrast of the circumference of it read a bad thing, Since there was little combination of setting out of the gain which can be decoded, an offset value, and shutter speed and change of a gain, an offset value, and shutter speed was needed by setting out of the optimal preset value repeatedly, SUBJECT that it took time until reading is successful dramatically occurred.

[0012]Since the reading port is intercepting outdoor daylight in the case of the optical reader of the type contacted and read on the label which furthermore contains signs, such as a bar code, It was rare to receive the influence of change of the surrounding reading environment, and when setting up the gain optimal at the time of manufacture, an offset value, and shutter speed, it did not need to change after that in many cases. However, the optical readers of the type which is detached and is read in the label containing a sign focusing on a two dimensional code reader in recent years have increased in number. Since this type of case received the influence of surrounding outdoor daylight in the label directly, SUBJECT that it was necessary to design the step of a preset value finely greatly [range / which can be set up], took time setting out of the preset value which can be decoded, and took time until decoding is successful dramatically occurred.

[0013]This invention solves such SUBJECT and it aims at providing the optical information reader in which high-speed reading is possible.

MEANS

[Means for Solving the Problem]In order to attain the above purpose the 1st optical information reader of this invention, An image sensor which incorporates catoptric light from a sign and is changed into an electrical signal, A gain control means by which a gain which amplifies an electrical signal from said image sensor can be set up, A binarization means which carries out binarization of the electrical signal amplified by A/D converter which changes into a digital signal an electrical signal amplified by said gain control means, or said gain control means, It has a decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said

sign has, and a gain storing means which stores a gain of said gain control means in nonvolatile memory which can back up electrically.
[0015]An image sensor which the 2nd optical information reader incorporates catoptric light from a sign, and is changed into an electrical signal, An offset control means which can set up an offset value of an electrical signal from said image sensor, A binarization means which carries out binarization of the electrical signal offset by an A/D converter which changes into a digital signal an electrical signal offset by said offset control means, or said offset control means, A decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, It has an offset value storing means which stores an offset value of said offset control means in nonvolatile memory which can back up electrically.
[0016]An image sensor which the 3rd optical information reader incorporates catoptric light from a sign, and is changed into an electrical signal, An electronic shutter control means which can set up shutter speed of said image sensor, A binarization means which carries out binarization of an A/D converter which changes an electrical signal from said image sensor into a digital signal, or the electrical signal from said image sensor, A decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, It has a shutter speed storing means which stores electrically shutter speed of said electronic shutter control means in nonvolatile memory which can back up.
[0017]The 4th optical information reader has after decoding a reading success-or-failure result storing means which stores electrically a value which shows a success or failure of decoding in nonvolatile memory which can back up.
[0018]The 5th optical information reader has after decoding a gain storing means which stores a gain at the time of decoding in nonvolatile memory which can back up electrically.
[0019]The 6th optical information reader has after decoding an offset value storing means which stores an offset value at the time of decoding in nonvolatile memory which can back up electrically.
[0020]The 7th optical information reader has after decoding a shutter speed storing means which stores shutter speed at the time of decoding in nonvolatile memory which can back up electrically.
[0021]The 8th optical information reader has a setting-out means to set up shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding, when the last decoding is successful.
[0022]The 9th optical information reader has a transmitting means which transmits after decoding shutter speed at the time of a value which shows a success or failure of decoding and/or a gain at the time of decoding and/or an offset value at the time of decoding and/, or decoding to a host etc.
[0023]A value the 10th optical information reader indicates the last success or failure of decoding transmitted to a host etc. by said transmitting means to be, A reception means which receives shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or

the last decoding from a host etc., It has a setting-out means to set up shutter speed at the time of a gain at the time of decoding and/or an offset value at the time of the last decoding and/, or the last decoding.
[0024]When a value which shows the last success or failure of decoding which the 11th optical information reader received by said reception means shows a success, It has a setting-out means to set up shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding.
[0025]
[Embodiment of the Invention]By it, the 1st optical information reader can store the gain of a gain control circuit, even if a metaphor reader is turned off by the above-mentioned composition by the gain storing means which consists of nonvolatile memory which can back up electrically.
[0026]By the offset value storing means which consists of nonvolatile memory which can back up electrically, the 2nd optical information reader can store the offset value of an offset control circuit, even if a metaphor reader is turned off.
[0027]By the shutter speed storing means which consists of nonvolatile memory which can back up electrically, the 3rd optical information reader can store the shutter speed of an electronic shutter control means, even if a metaphor reader is turned off.
[0028]By the reading success-or-failure result storing means which consists of nonvolatile memory which can back up electrically, the 4th optical information reader can store the value which shows a success or failure of decoding, even if a metaphor reader is turned off.
[0029]When the last decoding is successful, the 8th optical information reader can carry out decoding, after [the gain at the time of the last decoding, an offset value, and shutter speed] setting up at least any they are.
[0030]After decoding, even if the 9th optical information reader has little a value which shows a success or failure of decoding, gain, offset value, and shutter speed, it can transmit any they are to a host etc.
[0031]The 10th optical information reader can receive any at least one of the gain at the time of decoding, an offset value, and the shutter speed from a host last time which was transmitted to the host etc., and can set up those values.
[0032]Hereafter, an embodiment of the invention is described, referring to a figure.
[0033](Embodiment 1) The block diagram of the optical information reader of the embodiment of the invention 1 is shown in drawing 1. Explanation is omitted using the numerals with the same, same portion as drawing 10 in which the block diagram of a conventional example is shown here.
[0034]8 used eliminable EEPROM with the gestalt of this invention electrically as nonvolatile memory. Nonvolatile memory is not limited to EEPROM and contains a ferroelectric memory (FeRAM), and SRAM and DRAM which were backed up by the cell. By the nonvolatile memory 8, even when a reader is turned off, the data memorized in the memory can be held.
[0035]9 reads and is a switch, and if one [a reading switch], CPU6 will perform reading processing. Even if it constitutes a reading switch so that reading may be

ended when reading is performed and it turns OFF while one, it is not cared about as composition which does not matter as composition which will read once once one [a switch], and performs predetermined number-of-times reading. The reading switch 9 may not certainly be required and the reading instructions by the communication from a host may be sufficient as it.

[0036]Drawing 2 is the storing form of EEPROM8 an example to express, and A gain storing region, It is divided into the offset value storing region, the shutter speed storing region, and the reading success-or-failure result storing region, and after decoding a gain, an offset value, and the value that shows the preset value and reading success-or-failure result of shutter speed, respectively, it stores. In the embodiment of the invention 1, the success-or-failure result of the address of the gain at the time of decoding, an offset value, and the preset value of shutter speed and decoding is stored in EEPROM8 at the time of a success of decoding. After a gain, an offset value, or shutter speed is changed according to the output of a binarization circuit at the time of failure of decoding, the address of a gain, an offset value, and the preset value of shutter speed and the success-or-failure result of decoding are stored in EEPROM8.

[0037]In the example of drawing 2, a gain to the address (D000, D001, D002) of EEPROM8. The address (A000, B001, C005) of the gain, the offset value, and the preset value of shutter speed is stored as data, and a success/failure of decoding are stored in the address (D003) as a flag. Data (0000) is written in an address (D003) at the time of failure of data (0001) and decoding at the time of a success of decoding.

[0038]Next, the flow of processing of the embodiment of the invention 1 is shown in drawing 3. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here.

[0039]Step 11 is a setting-out means and sets the gain, the offset value, and shutter speed which were stored last time as the gain control circuit 3, the offset control circuit 5, and the image sensor drive circuit 2, respectively. When the data shown in drawing 2 is specifically stored, CPU6 sets up the preset value (the gain 0, the offset value 1, the shutter speed 5) which makes an address the data (A000, B001, C005) stored in the address (D000, D001, D002), and it follows it to Step 2. When decoding is successful, to a host After data transmission (Step 6), a gain, An offset value and shutter speed are stored in the address (D000, D001, D002) of EEPROM8, respectively (Step 12), The data (0001) in which a decoding success is shown after that is stored in the address (D003) of EEPROM8 (Step 13), and reading processing is ended. When decoding goes wrong, do not transmit data to a host but according to the output of a binarization circuit, At least one of a gain, an offset value, and the shutter speed is changed (Step 5), The changed preset value is stored in the address (D000, D001, D002) of EEPROM8, respectively (Step 12), the data (0000) in which decoding failure is shown after that is stored in the address (D003) of EEPROM8 (Step 13), reading processing is ended, and a power supply is disconnected.

[0040]Concretely, when there are many values the output of a binarization circuit indicates black to be when decoding goes wrong, or when it is judged that the

period which shows black is long, it is judged that a binarization output is small and an offset value and a gain are raised at Step 5. Conversely, when there is much white, an offset value and a gain are lowered.
[0041]Thus, in order to lessen the consumed electric current, when putting a power supply into a reader only at the time of reading, the luminosity of the printing condition and ambient environment of the time of reading last time and a bar code, especially the circumference is the same, Since the gain, the offset value, and shutter speed which can be decoded are set up at Step 11 when the last decoding is successful, it can decode by the first setting out after powering on, and is effective in shortening reading time.
[0042]Even if it generally reads, it is almost the same in many cases if ambient environment, such as a luminosity at the time, is the interior of a room, and it is the outdoors, it changes gently in many cases, without changing suddenly.
[0043]If the bar code beforehand printed by the bag and the container is removed, in a factory or a warehouse, the code used in the transportation industry is printed black, and the almost same thing can decode a printing condition in many cases with the gain, the offset value, and shutter speed which there were and were successful by the last decoding. [much]
[0044](Embodiment 2) Although the device which reads a bar code was used as a sign in Embodiment 1, it is clear that a sign is not limited to a bar code but a two dimensional code and OCR are also included. The block diagram of the optical information reader of the embodiment of the invention 2 which is a device which reads a two dimensional code and OCR is shown in drawing 4. 10 changes an analog signal into the digital value of 8 bits instead of the binarization circuit 5 of drawing 1 by an A/D converter. Area image sensors, such as area CCD, are used for the image sensor 1. Since the output of an area image sensor has data in the direction of two dimensions, In the binarization circuit 5 which was being used with the bar code reader of a conventional example or Embodiment 1, since it is influenced by shading etc. and binarization cannot be carried out correctly, A/D converter 10 is used, it is changed into the digital signal which is 8 bits, and binarization processing is performed by CPU6. 11 is an image memory, and there are usually many pixels of an area image sensor as about 330,000 pixels, and since they generally cannot build a memory in CPU6, they are constituted from SRAM or a DRAM by the exterior of CPU6. CPU6 decodes the data of the image memory 11. The DMA (Direct Memory Access) circuit for storing the output of A/D converter 10 in the image memory 11 is not illustrated. An area CCD or CMOS type area image sensor is also available for the image sensor 1.
[0045]Next, the flow of processing of the embodiment of the invention 2 is shown in drawing 5. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here, and drawing 3 in which the flow chart of the embodiment of the invention 1 is shown.
[0046]Step 14 is the processing which incorporates the output of A/D converter 10 into the image memory 11, and progresses to decoding of a two dimensional code or OCR after the end of incorporation (Step 15).

[0047]When an area image sensor is used for the image sensor 1, since there are many pixel numbers, it takes time processing of Step 14 in which the output of A/D converter 10 is incorporated. Furthermore, as for the two dimensional code of Step 15, or decoding of OCR, in order that CPU6 may perform binarization processing in soft in addition to there being many data numbers, one decoding takes time. Therefore, in [when the last decoding is successful] next decoding, Since the last gain, offset, and the conditioning of shutter speed can be used as it is if the printing conditions and ambient environment of a two dimensional code or OCR are the same conditions, certain and the effect of decoding being possible for a short time, explaining and depending by Embodiment 1, and shortening reading time are large.
[0048]The storing form to the memory of a gain, an offset value, shutter speed, and a reading success-or-failure result presupposed that it is the same as drawing 2 shown by Embodiment 1.
[0049](Embodiment 3) The flow of the processing of the embodiment of the invention 3 to the next is shown in drawing 6. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here, drawing 3 in which the flow chart of Embodiment 1 is shown, and drawing 5 in which the flow chart of Embodiment 2 is shown. The same thing as drawing 1 used by Embodiment 1 is used for the block diagram used by an embodiment.
[0050]In Step 16, a gain, offset, and reception of shutter speed are supervised from a host, and when there are received data, data is received (Step 17). At Step 11, the gain, the offset value, and shutter speed which were received are set up. Incorporation (Step 2) of a binarization circuit output and decoding (Step 3) of a bar code are performed after that, and the value, the gain, the offset value, and shutter speed which are not concerned with a success/failure of decoding, but show a success or failure of decoding to a host are transmitted to a host (Step 18).
[0051]Although successful gain, offset value, and shutter speed were stored in Embodiment 1 at the time of a decoding success, According to Embodiment 3, it is not concerned with a success/failure of decoding after decoding, but the value which shows a success/failure of decoding, a gain and an offset value, and shutter speed are transmitted to a host.
[0052]A gain when it has such composition, in case decoding is successful, an offset value, and the combination of shutter speed, Even if the combination of a gain in case decoding goes wrong, an offset value, and shutter speed can be put in a database by a host and decoding goes wrong, By changing a gain, an offset value, and shutter speed, a possibility of succeeding in decoding can set up a high combination easily, and can shorten reading time so that it may become the combination which was successful in the past. Since memory space also has many hosts, such as PC and POS, including optical storage devices, such as a hard disk, and the execution speed of CPU generally also has it, [quicker than an optical reader] It is easy to use combination of a lot of gains, offset values, and SHATA speeds as a database, and to choose the optimal preset value.
[0053](Embodiment 4) The block diagram of the optical information reader of the

embodiment of the invention 4 is shown in drawing 7. Explanation is omitted using the numerals with the same, same portion as drawing 10 in which the block diagram of a conventional example is shown here, drawing 1 in which the block diagram of Embodiment 1 and Embodiment 3 is shown, and drawing 4 in which the block diagram of Embodiment 2 is shown.

[0054]A host deserves the handy terminal part shown with a right dashed line for the reading part shown in a left dashed line part. 22 is a display which comprises a liquid crystal, CRT, etc., and displays the directions to a decoded result or a worker. 23 is a key input section and also inputs directions of reading directions of a bar code besides the input of a number etc., ON and OFF of a power supply, etc. 24 is control power supply and performs not only a handy terminal part but control of the power supply of a reading part, control of charge of an internal battery (not shown), etc. 21 is main CPU and a communication function with a reading part, control of the display 22, the input process from the key input section 23, PC, POS, etc. are performing communication with the host of a higher rank, etc. further. In the embodiment of the invention 4, EEPROM8 has been arranged in the handy terminal part. In order that this may memorize the decoded result of the bar code, etc. in the handy terminal part from the former, Since SRAM or DRAM backed up by EEPROM which is nonvolatile memory, or the cell is used, it is from the reason for newly not providing nonvolatile memory. Since it was on the same board, direct continuation of between CPU6 of a reading part and main CPU21 of a handy terminal part was carried out without using communication I/F7.

[0055]The flow of processing of the embodiment of the invention 4 is shown in drawing 8 and drawing 9. Explanation is omitted using the numerals with the same, same processing as drawing 11 in which the flow chart of a conventional example is shown here, drawing 3 in which the flow chart of Embodiment 1 is shown, drawing 5 in which the flow chart of Embodiment 2 is shown, and drawing 6 in which the flow chart of Embodiment 3 is shown.

[0056]When drawing 8 is processing of a handy terminal part and there is an input of the reading key of a bar code from the key input section 23, The data containing the data of the value which shows the success or failure of the last decoding stored in EEPROM8, the last gain, the last offset value, and the last shutter speed is transmitted to a reading part (Step 30). The instructions (command) which make it read to a reading part are also included in send data.

[0057]Drawing 9 is processing of a reading part, supervises reception of the gain from a handy terminal part, an offset value, and shutter speed (Step 20), and when there are received data, it receives data (Step 21). When the instructions which analyze the received data and make it read to the received data are included and the further last decoding is successful (Step 10), the received last gain, the last offset value, and the last shutter speed are set up (Step 11). When received data are analyzed at Step 10 and the last decoding has gone wrong, any at least one of the received last gain, the last offset value, and the last shutter speed is changed (Step 5), and the changed value is set up (Step 11). Incorporation (Step 2) of a binarization circuit output and decoding (Step 3) of a bar code are performed after that, and the value, the gain, the offset value, and

shutter speed which are not concerned with a success/failure of decoding, but show a success or failure of decoding to a handy terminal part are transmitted (Step 22).
[0058]When reception is supervised at Step 31 of the handy terminal part of drawing 8 and the data transmitted at Step 22 has the received data of a gain, an offset value, and shutter speed, data is received from a reading part (Step 32). The value, the gain, the offset value, and shutter speed which show a success or failure of decoding are contained in the received data, and each is stored in EEPROM8 at Step 33 and Step 34.
[0059]Delete Step 10 and Step 5 of drawing 9, and as shown in drawing 3 of Embodiment 1, a success/failure of decoding are judged at Step 4 after Step 3, When transmitting the preset value at the time of decoding to a handy terminal part when decoding is successful (Step 22), and having failed, after changing a preset value by Step 5, it may be made to transmit the preset value after change to a handy terminal part (Step 22).
[0060]The value which deletes Step 10 and Step 5 of drawing 9, and shows a success or failure of decoding at Step 22, A gain, an offset value, and shutter speed can be transmitted and it can also have composition which changes a gain, an offset value, and shutter speed in a handy terminal part instead of Step 5.
[0061]It is necessary to lessen the consumed electric current, and, in the case of a handheld terminal, generally, a power supply is put into a reading part like Embodiment 4 only at the time of reading for a battery drive. Since the gain, the offset value, and shutter speed which can be decoded are set up at Step 11 when the last decoding with same luminosity of the printing condition and ambient environment of the time of reading last time and a bar code, especially the circumference is successful, It can decode by the first setting out and is effective in shortening reading time.
[0062]Since the bar code data etc. which were read in the former were stored in nonvolatile memory in the handy terminal part, in order to store a gain, an offset value, and shutter speed, What is necessary is just to secure several bytes of new field, and it is effective in newly not extending nonvolatile memory.
[0063]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The block diagram of the optical information reader in the embodiment of the invention 1
[Drawing 2]The explanatory view of an example of the storing form of EEPROM of the optical information reader in the embodiments of the invention 1-4
[Drawing 3]The flow chart of the optical information reader in the embodiment of the invention 1
[Drawing 4]The block diagram of the optical information reader in the embodiment of the invention 2
[Drawing 5]The flow chart of the optical information reader in the embodiment of the invention 2

[Drawing 6]The flow chart of the optical information reader in the embodiment of the invention 3
[Drawing 7]The block diagram of the optical information reader in the embodiment of the invention 4
[Drawing 8]The flow chart of the handy terminal part of the optical information reader in the embodiment of the invention 4
[Drawing 9]The flow chart of the reading part of the optical information reader in the embodiment of the invention 4
[Drawing 10]The block diagram of the conventional optical information reader
[Drawing 11]The flow chart of the conventional optical information reader
[Drawing 12]The explanatory view of an example of the storing form of the gain in program memory, an offset value, and shutter speed
[Description of Notations]
1 Image sensor
2 Image sensor drive circuit
3 Gain control circuit
4 Offset control circuit
5 Binarization circuit
6 CPU
7 Communication I/F
8 EEPROM
9 Reading switch
10 A/D converter
11 Image memory
21 Main CPU
22 Display
23 Key input section
24 Control power supply

[Claim(s)]
[Claim 1]An optical information reader comprising:
An image sensor which incorporates catoptric light from a sign and is changed into an electrical signal.
A gain control means by which a gain which amplifies an electrical signal from said image sensor can be set up.
A binarization means which carries out binarization of the electrical signal amplified by A/D converter which changes into a digital signal an electrical signal amplified by said gain control means, or said gain control means.
A decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, and a gain storing means which stores a gain of said gain control means in nonvolatile memory which can back up electrically.

[Claim 2]An optical information reader comprising:
An image sensor which incorporates catoptric light from a sign and is changed into an electrical signal.

An offset control means which can set up an offset value of an electrical signal from said image sensor.
A binarization means which carries out binarization of the electrical signal offset by an A/D converter which changes into a digital signal an electrical signal offset by said offset control means, or said offset control means.
A decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, and an offset value storing means which stores an offset value of said offset control means in nonvolatile memory which can back up electrically.

[Claim 3]An optical information reader comprising:
An image sensor which incorporates catoptric light from a sign and is changed into an electrical signal.
An electronic shutter control means which can set up shutter speed of said image sensor.
A binarization means which carries out binarization of an A/D converter which changes an electrical signal from said image sensor into a digital signal, or the electrical signal from said image sensor.
A decode means which decodes a signal which is an electrical signal from said image sensor, and was digitized in order to restore information which said sign has, and a shutter speed storing means which stores electrically shutter speed of said electronic shutter control means in nonvolatile memory which can back up.

[Claim 4]claim 1, 2, or 3 which has a reading success-or-failure result storing means which stores electrically a value which shows a success or failure of decoding after decoding in nonvolatile memory which can back up -- an optical information reader given in either.
[Claim 5]The optical information reader according to claim 1 which has a gain storing means which stores a gain at the time of decoding in nonvolatile memory which can back up electrically after decoding.
[Claim 6]The optical information reader according to claim 2 which has an offset value storing means which stores an offset value at the time of decoding in nonvolatile memory which can back up electrically after decoding.
[Claim 7]The optical information reader according to claim 3 which has a shutter speed storing means which stores shutter speed at the time of decoding in nonvolatile memory which can back up electrically after decoding.
[Claim 8]The optical information reader according to any one of claims 1 to 7 which has a setting-out means to set up shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding when the last decoding is successful.
[Claim 9]The optical information reader according to any one of claims 1 to 7 which has a transmitting means which transmits shutter speed at the time of a value which shows a success or failure of decoding after decoding and/or a gain at the time of decoding and/or an offset value at the time of decoding and/, or decoding to a host etc.
[Claim 10]The optical information reader comprising according to claim 9:

A reception means which receives from a host etc. shutter speed at the time of a value which shows a success or failure of last time of decoding transmitted to a host etc. by said transmitting means and/or a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding. A setting-out means to set up shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding.

[Claim 11]When a value which shows a success or failure of last time of decoding received by said reception means shows a success, claim 9 or 10 which has a setting-out means to set up shutter speed at the time of a gain at the time of the last decoding and/or an offset value at the time of the last decoding and/, or the last decoding -- an optical information reader given in either.